RAMAIAH UNIVERSITY OF APPLIED SCIENCES

M.S. Ramaiah University of Applied Sciences

Programme Structure and Course Details

of

M. Pharm Pharmacognosy

2022-2024

Programme Code: 056

Registrar
M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

Faculty of Pharmacy

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University's Vision, Mission and Objectives

The M. S. Ramaiah University of Applied Sciences (MSRUAS) will focus on student-centric professional education and motivates its staff and students to contribute significantly to the growth of technology, science, economy and society through their imaginative, creative and innovative pursuits. Hence, the University has articulated the following vision and objectives.

Vision

MSRUAS aspires to be the premier university of choice in Asia for student centric professional education and services with a strong focus on applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment

Mission

Our purpose is the creation and dissemination of knowledge. We are committed to creativity, innovation and excellence in our teaching and research. We value integrity, quality and teamwork in all our endeavors. We inspire critical thinking, personal development and a passion for lifelong learning. We serve the technical, scientific and economic needs of our Society.

Objectives

1. To disseminate knowledge and skills through instructions, teaching, training, seminars, workshops and symposia in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to equip students and scholars to meet the needs of industries, business and society
2. To generate knowledge through research in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to meet the challenges that arise in industry, business and society
3. To promote health, human well-being and provide holistic healthcare
4. To provide technical and scientific solutions to real life problems posed by industry, business and society in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences
5. To instill the spirit of entrepreneurship in our youth to help create more career opportunities in the society by incubating and nurturing technology product ideas and supporting technology backed business
6. To identify and nurture leadership skills in students and help in the development of our future leaders to enrich the society we live in
7. To develop partnership with universities, industries, businesses, research establishments, NGOs, international organizations, governmental organizations in India and abroad to enrich the experiences of faculties and students through research and developmental programmes

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Programme Structure and Course Details of M. Pharm M. Pharm in Pharmacognosy 2022-2024

Faculty	Pharmacy
Department	Pharmacognosy
Programme Code	056
Programme Name	M. Pharm. Pharmacognosy
Dean of the Faculty	Dr. S. Bharath
HOD	Dr. Ashoka Babu VL

1. **Title of the Award:** M. Pharm. in Pharmacognosy
2. **Mode of Study:** Full-Time
3. **Awarding Institution /Body:** M. S. Ramaiah University of Applied Sciences, Bengaluru
4. **Joint Award:** Not Applicable
5. **Teaching Institution:** Faculty of Pharmacy, M. S. Ramaiah University of Applied Sciences, Bengaluru
6. **Date of Programme Specifications:** July 2022
7. **Date of Programme Approval by the Academic Council of MSRUAS:** 06 April 2017
8. **Next Review Date:** June 2024
9. **Programme Approving Regulating Body and Date of Approval:** Pharmacy Council of India
10. **Programme Accredited Body and Date of Accreditation:** Not Applicable
11. **Grade Awarded by the Accreditation Body:** Not Applicable
12. **Programme Accreditation Validity:** Not Applicable
13. **Programme Benchmark:** Not Applicable
14. **Rationale for the Programme**

Pharmacognosy is a systematic study of crude drugs obtained from plant, animal and mineral sources. From time immemorial, curing of diseases commenced by experimenting with natural products leading to the modern drug therapy and this has made Pharmacognosy as the "mother" of all innovations. This is a multidisciplinary science, which deals with naturally derived drugs and it incorporates various modern analytical techniques to authenticate and standardize crude drugs as well as extracts. Thus, Pharmacognosy will remain to be a precursor and significant contributor in new drug discoveries. As per WHO reports nearly 70% of the world population use herbal/natural products towards treatment of various ailments due to the belief that they do not have any side effects unlike the modern synthetic drugs. To prove such belief and to benefit the patients suffering from various diseases, identification and standardization of herbal medicines are being carried out worldwide and the study of Pharmacognosy is very essential in this regard. Taking into consideration the excellent opportunities available in the field of pharmacognosy, post graduate course in M. Pharm. in Pharmacognosy is being offered.

The M. S. Ramaiah College of Pharmacy, now a constituent of MSRUAS as Faculty of Pharmacy has been in existence for more than two decades. Over the years, Faculty of Pharmacy of MSRUAS has grown and evolved as one of the Premier Institutions in the state of Karnataka. It has very good infrastructure, noteworthy laboratory facilities, experienced and competent

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faculty members. During the last two decades it has produced over 1000graduates and 120Post graduates. The presence of other Faculties of applied sciences in the University will facilitate the students to have a better experience and exposure in comparison to the conventional training procedures.

Faculty of Pharmacy of MSRUAS offering M. Pharm programme in Pharmacognosy featured with semester pattern curriculum is aimed to emphasize the concepts in the isolation of novel compounds and design of dosage forms. Importance will be given to research projects based on industrial needs and in terms of novelty for patenting the application. The curriculum is structured to impart the students to take independent professional responsibilities and acquire necessary skills to compete with their global counterparts.

15. Programme Mission

Masters degree programme in Pharmacognosy is aimed to achieve the Postgraduates an advanced knowledge both in theoretical and applied topics; high order skills in analysis, critical evaluation and professional application; think differently and independently to solve complex problems related to research and pharmaceutical processes

16. Graduate Attributes(GAs)

GA-1. Pharmacy Knowledge: Ability to acquire knowledge and comprehend the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

GA-2. Planning Abilities: Ability to demonstrate effective planning including time management, resource management, delegation skills and organizational skills. Also to develop and implement plans and organize work to meet deadlines.

GA-3. Problem analysis: Ability to utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

GA-4. Modern tool usage: Ability to learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

GA-5. Leadership skills: Ability to understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Also to assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

GA-6. Professional Identity: Ability to understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

GA-7. Pharmaceutical Ethics: Ability to honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical

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frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

GA-8. **Communication:** Ability to communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, give and receive clear instructions.

GA-9. **The Pharmacist and society:** Ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

GA-10. **Environment and sustainability:** Ability to understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

GA-11. **Life-long learning:** Ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- access and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

17. Programme Outcomes (POs)

M.Pharm. graduates will be able to:

PO-1. **Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO-2. **Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO-3. **Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO-4. **Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO-5. **Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

PO-6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

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PO-7. Pharmaceutical Ethics: Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO-8. Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

PO-9. The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO-10. Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-11. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

18. Programme Goal

The Programme goal is to produce proficient postgraduates with advanced knowledge and skills in formulating, synthesizing and analysis of medicinal agents and pharmaceuticals.

19. Program Educational Objectives (PEOs)

The objectives of the M. Pharm program in Pharmacognosy are to:

PEO-1. Provide students with various advancements in herbal drug research to enable them to devise and deliver efficient solutions to challenging problems in Pharmacy and allied disciplines

PEO-2. Impart analytic and cognitive skills required to develop innovative solutions for R&D, Industry, and societal requirements

PEO-3. Provide sound knowledge of pharmacy, managerial and entrepreneurial skills to enable students to contribute to the well-being and welfare of the society

PEO-4. Inculcate strong human values and social, interpersonal and leadership skills required for professional success in evolving global professional environments

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20. Programme Specific Outcomes (PSOs)

At the end of the M. Pharm program in Pharmacognosy, the graduate will be able to:

PSO-1. Apply the knowledge to ensure the quality of herbal drugs and pharmaceuticals by using various modern techniques to develop innovative and safe solutions to real-world problems

PSO-2. Adapt to various advancements in herbal drug research/industries, isolation of phytoconstituents, summarize the concepts of traditional system of medicines and explicate the various aspects of biotechnology and natural products of medicinal interest

PSO-3. Enable the leadership qualities and strive for the betterment of organization, environment, and society

PSO-4. Demonstrate an understanding of the importance of life-long learning through professional development, practical training, and specialized certifications

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21. Programme Structure:

Table 1: Programme Structure

SEMESTER – I			
Course Code	**Course**	**Credits**	**Hours/Week**
DEPARTMENT COMMON COURSE			
PGF501	1.Modern Pharmaceutical Analytical Techniques	4	4
PROGRAMME SPECIALIZATION COURSES			
PGC502	1.Advanced Pharmacognosy - I	4	4
PGC503	2.Phytochemistry	4	4
PGC504	3. Industrial Pharmacognostical Technology	4	4
PGL505	4. Pharmacognosy Practical – I	6	12
PGS506	5.Seminar / Assignment	4	7
SEMESTER - II			
PROGRAMME SPECIALIZATION COURSES			
PGC507	1.Medicinal Plant Biotechnology	4	4
PGC508	2 Advanced Pharmacognosy – II	4	4
PGC509	3.Indian Systems of Medicine	4	4
PGC510	4. Herbal Cosmetics	6	12
PGL511	5. Pharmacognosy Practical - II	6	12
PGS512	6.Seminar / Assignment	4	7
SEMESTER - III			
PROGRAMME SPECIALIZATION COURSES			
PGF613	1.Research Methodology and Biostatistics	4	4
PGF614	2.Journal Club	1	1
PGF615	3.Group Project	4	-
PGF616	4.Discussion / Presentation (Proposal Presentation)	2	2
PGF617	5.Research Work	14	28
SEMESTER - IV			
PROGRAMME SPECIALIZATION COURSES			
PGF618	1.Journal Club	1	1
PGF619	2.Discussion / Presentation	3	3
PGF620	3. Research Work	16	31
	MANDATORY COURSE/S		
PGF621	1.Participation/Presentation in research forum: National / International Seminar, Conferences, Workshops	1-3	-
PGF622	2.Publication: National / International Journals		-
PGF623	3.Academic/Research award: State/National/International Agencies		-

22. Course Delivery: As per the Timetable

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23. Teaching and Learning Methods

1. Face to Face Lectures using Audio-Visuals
2. Workshops, Group Discussions, Debates, Presentations
3. Demonstrations
4. Guest Lectures

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5. Laboratory work/Fieldwork/Workshop
6. Industry Visit
7. Seminars
8. Group Exercises
9. Project Work
10. Project
11. Exhibitions
12. Technical Festivals

24. Assessment and Grading

Table 2 Assessment and Grading

Semester I

Course code	Name of Course	Internal Assessment				Semester End Examination		Total marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
PGF501	1.Modern Pharmaceutical Analytical Techniques	10	15	1 h	25	75	3 h	100
PGC502	1.Advaned Pharmacognosy – I	10	15	1 h	25	75	3 h	100
PGC503	2.Phytochemistry	10	15	1 h	25	75	3 h	100
PGC504	3.Industrial Pharmacognostical Technology	10	15	1 h	25	75	3 h	100
PGL505	4. Pharmacognosy Practicals- I	20	30	6 h	50	100	6 h	150
PGS506	5.Seminar / Assignment	-	-	-	-	-	-	100

Semester II

Course code	Name of Course	Internal Assessment				Semester End Examination		Total marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
PGC507	1. Medicinal Plant Biotechnology	10	15	1 h	25	75	3 h	100
PGC508	2.Advanced Pharmacognosy – II	10	15	1 h	25	75	3 h	100
PGC509	3. Indian Systems of Medicine	10	15	1 h	25	75	3 h	100
PGC510	4. Herbal Cosmetics	10	15	1 h	25	75	3 h	100
PGL511	5. Pharmacognosy Practicals- II	20	30	6 h	50	100	6 h	150
PGS512	6.Seminar / Assignment	-	-	-	-	-	-	100

Semester III

Course code	Name of Course	Internal Assessment				Semester End Examination		Total marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
PGF613	1.Research Methodology and Biostatistics	10	15	1 h	25	75	3h	100

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PGF614	2.Journal Club	-	-	-	25	-	-	25
PGF615	3.Group Project	-	-	-	-	-	-	-
PGF616	4.Discussion / Presentation (Proposal Presentation)	-	-	-	50	-	-	50
PGF617	5.Research Work	-	-	-	-	350	1 h	350

Semester IV

Course code	Name of Course	Internal Assessment				Semester End Examination		Total marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
PGF618	1.Journal Club	-	-	-	25	-	-	25
PGF619	2.Discussion / Presentation	-	-	-	75	-	-	75
PGF620	3. Research Work	-	-	-	-	400	1 h	400

24.1 Components of Grading

There shall be **two components** of grading in the assessment of each course:

Component 1, Continuous Evaluation (CE): This component involves multiple subcomponents (SC1, SC2, etc.) of learning assessment. The assessment of the subcomponents of CE is conducted during the semester at regular intervals. This subcomponent represents the formative assessment of students' learning.

Component 2, Semester-end Examination (SEE): This component represents the summative assessment carried out in the form an examination conducted at the end of semester.

Marks obtained CE and SEE components have a weightage of 25:75 (CE:25% and SEE: 75%) in determining the final marks obtained by a student in a Course.

The complete details of Grading are given in the Academic Regulations.

24.2 Continuous Evaluation Policies

Continuous evaluation depends on the type of the course as discussed below:

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24.2.1 Theory Courses

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			Component 2: SEE (75% Weightage)
Subcomponent ▶	SC1	SC2	SC3	
Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 75 Marks
Maximum Marks ▶	8	2	15	
CO-1				
CO-2				
CO-3				
CO-4				
CO-5				
CO-6				
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

24.2.2 Laboratory Courses

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component1: CE(25%Weightage)			Component2: SEE (75%Weightage)
Subcomponent▶	SC1	SC2	SC3	
Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 100 Marks
Maximum Marks▶	10	10	30	
CO-1				
CO-2				
CO-3				
CO-4				
CO-5				
The details of SC1,SC2,SC3 are presented in the Programme Specifications Document.				

Table 3:- Scheme for awarding Continuous Evaluation-Theory

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction**	2
Total	10

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Table 4:- Guidelines for the allotment of marks for attendance*

Percentage of Attendance	Theory
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

Theory
(Component -1: 25 Marks + Component-2: 75Marks)
Component - 1: - 25 Marks
It has two sub-components (Part A& B)
Part – A: Continuous Evaluation: 10 Marks
The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Table 3: - Scheme for awarding Continuous Evaluation-Theory

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction**	2
Total	10

** student will be continuously assessed during theory and practical sessions

Table 4: - Guidelines for the allotment of marks for attendance*

Percentage of Attendance	Theory
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

Part – B: Sessional Examination: 15 Marks
Two sessional examinations (each for 15 Marks with one hour duration) will be conducted. Average marks of the two sessionals will be computed for sessional examination marks.
Component -2 Semester End Theory Examination:75 Marks
Theory Examination: A theory exam shall be conducted for maximum marks 75 Marks with three hours of duration

Practical – 150 Marks

(Component -1: 50 Marks + Component-2: 100Marks)
Component - 1: - 50 Marks
It has two sub-components (Part A& B)

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Part – A: Continuous Evaluation: 20 Marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Scheme for awarding Continuous Evaluation -Practical

Criteria	Maximum Marks
Attendance*	10
Practical Records, Regular viva-voce**	10
Total	20

Guidelines for allotment of marks for attendance*

Percentage of Attendance	Practical
95 – 100	10
90 – 94	7.5
85 – 89	5
80 – 84	2.5
Less than 80	0

Part – B: Sessional Examination: 30 Marks

Two sessional examinations (each for 30 Marks with six-hour duration) will be conducted. Average marks of the two sessionals will be computed for sessional examination marks.

Component -2 Semester End Practical Examination: 100Marks

Practical Examination: 100 Marks with six hours of duration. The practical examination shall also consist of a viva –voce (Oral) examination.

The assessment questions are set to test the learning outcomes. In each component a certain learning outcome is assessed.

Note: For more details on the break-ups, please refer to the Course Specifications

A student is required to score an overall 50% for successful completion of a course and earn the credits.

Note: Final marks awarded in each of the courses will be confirmed only after SAB/PAB as explained in Academic Regulations of M. Pharm Programme.

Assignment & Seminar

The detailed procedure and evaluation procedure is available in the Operation Manual / Student Handbook/Academic Regulations.

Journal Club

The detailed procedure and evaluation procedure is available in the Operation Manual / Student Handbook/Academic Regulations.

Group Project

The detailed procedure and evaluation procedure is available in the Operation Manual / Student Handbook/Academic Regulations

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Mandatory Courses

The credit points assigned for extracurricular and or co-curricular activities shall be given by the Dean of the Faculty and the same shall be submitted to the University.

Name of the Activity	Maximum credit points Eligible/Activity
Participation in National level Seminar/ Conference / Workshop/Symposium/Training Programs	01
Participation in International level outside India Seminar/ Conference / Workshop/Symposium/Training Programs (Related to the specialization of the student)	02
Academic Award/Research Award from State Level/National Agencies	01
Academic Award/Research Award from International Agencies	02
Research/Review Publication in National Journals (Indexed in Scopus/Web of Science)	01
Research/Review Publication in International Journals (Indexed in Scopus/Web of Science)	02

Dissertation/Research Work

1. Every candidate shall carry out work on an assigned research project under the guidance of a recognized Postgraduate Teacher, the result of which shall be written up and submitted in the form of a dissertation.
2. Work for writing the Dissertation is aimed at contributing to the development of spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in pharmaceutical/medical sciences and the manner of identifying and consulting available literature. Dissertation shall be submitted as per the notified time schedule mentioned in the Academic calendar / student hand book.
3. The Dissertation and viva-voce shall be evaluated by two examiners, one Internal and one External examiner appointed by the University.

Scheme of Evaluation of Dissertation book:

Objective(s) of the work done: 50 Marks
Methodology adopted: 150 Marks
Results and Discussions: 250 Marks
Conclusions and Outcomes: 50 Marks

Total: 500 Marks

Scheme of Evaluation of Presentation:

Presentation of work: 100 Marks
Communication skills: 50 Marks
Question and answer skills: 100 Marks

Total: 250 Marks

A student is required to score a minimum of 50% overall for successful completion of Dissertation and earn the corresponding credits.

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Supplementary/re-registration examination and improvement of sessional marks

The eligibility criteria and procedures for supplementary examination and improvement of sessional marks are as per the Pharmacy Council of India (PCI) norms and as indicated in the Academic Regulations governing this programme.

25. Student Support for Learning

1. Course Notes
2. Reference Books in the Library
3. Magazines and Journals
4. Internet Facility
5. Computing Facility
6. Laboratory Facility
7. Workshop Facility
8. Staff Support
9. Lounges for Discussions
10. Any other support that enhances their learning

26. Quality Control Measures

1. Review of Course Notes
2. Review of Question Papers and Assignment Questions
3. Student Feedback
4. Moderation of Assessed Work
5. Opportunities for students to see their assessed work
6. Review of external examiners and external examiners reports
7. Staff Student Consultative Committee meetings
8. Student exit feedback
9. Subject Assessment Board (SAB)
10. Programme Assessment Board (PAB)

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27. Programme Map (Course-PO-PSO Map)

Sem.	Course Title	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
1	Modern Pharmaceutical Analytical Techniques	3	2	2	2		1	1	1			1	3	3		2
1	Advanced Pharmacognosy I	3	2	2	2			2	1		1	2	3	2	2	2
1	Phytochemistry	3	2	3	2	2	2	2	2	1	2	2	3	2	2	2
1	Industrial Pharmacognostical Technology	3	3	2	2	3	2	3	2	2	1	3	3	1	2	2
1	Pharmacognosy Practical- I	3	3	3	2	3	2	2	2	1	2	3	3	3	2	2
1	Seminar / Assignment	3	1	3		2			3			3			2	2
2	Medicinal Plant Biotechnology	3	2	2	2			1	1		2	2	3	2		2
2	Advanced Pharmacognosy– II	3	2	3	2	2	2	1	2	3	2	2	2	2	1	1
2	Indian Systems of Medicine	3	2	2	2	1	2	2	2	2	2	2	2	2	2	2
2	Herbal Cosmetics	3	1	1	2	2	2	2	2	2	2	2	3	2	2	2
2	Pharmacognosy Practicals II	3	3	3	2	2	2	1	2	1		3	3	3	1	3
2	Seminar / Assignment	3	1	3		2			3			3			2	2
3	Research Methodology and Biostatistics	3		3	2			3	2			2	3	2		2
3	Journal Club	3	3	3	3	3		2	3			3	3		3	3
3	Group Project	3	3	3	3	3	2	1	2	3	1	2	3	3	2	1
3	Discussion / Presentation (Proposal Presentation)	3	3	3	2	3	3	2	3	3	2	3	3	3	3	2
3	Research Work	3	2	2	2	1	1	2	2	2	1	3	1	2	1	2
4	Journal Club	3	3	3	3	3		2	3			3	3		3	3
4	Discussion / Presentation	2	3	3	3	2	2	1	3	1	1	2	3	3	3	3
4	Research Work	3	2	2	2	1	1	2	2	2	1	3	1	2	1	2
4	Participation/Presentation in research forum: National / International Seminar, Conferences, Workshops	3	3	2	1	3	3	3	3	2	1	3	1	1	3	3
4	Publication: National / International Journals	3	2	1	2		1		3	1	2	2	2	2	1	2
4	Academic/Research award: State/National/International Agencies	3	3	3	1	1	1	1	3		1	1	3	1	3	3

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28. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposia, paper writing, attending industry exhibitions, project competitions and related activities for enhancing their knowledge and networking.

29. Cultural and Literary Activities

Annual cultural festivals are held to showcase the creative talents in students. They are involved in planning and organizing the activities.

30. Sports and Athletics

Students are encouraged to take part in sports and athletic events regularly. Annual sports meet will be held to demonstrate sportsmanship and competitive spirit.

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RAMAIAH UNIVERSITY OF APPLIED SCIENCES

M.S. Ramaiah University of Applied Sciences

Course Specifications

M. Pharm in Pharmacognosy

Programme Code: 056

M.S. Ramaiah University of Applied Sciences Bangalore - 560054

Faculty of Pharmacy
Batch: 2022-2024

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SEMESTER I

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Course Specifications: Modern Pharmaceutical Analytical Techniques (Theory)

Course Title	Modern Pharmaceutical Analytical Techniques (Theory)
Course Code	PGF501
Course Type	Core Theory
Department	Pharmaceutical Chemistry
Faculty	Pharmacy

1. Course Summary

The aim of this course is to impart knowledge and to familiarize the students with the principles, instrumentation and applications of UV-visible, IR, NMR, and Mass spectroscopy, as well as X-ray crystallography and thermo-analytical techniques in the analysis of various drugs and pharmaceuticals. The course also emphasizes chromatographic and electrophoretic separation techniques.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture :Tutorial: Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmaceutical Chemistry
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Summarize the fundamental principles, theory, and applications of UV-visible and IR spectroscopy, fluorimetric analysis, flame emission and atomic absorption spectroscopy

CO-2. Theory, instrumentation and applications of NMR and Mass spectroscopy,

CO-3. Explain the principles and applications of chromatographic, and electrophoretic separationtechniques

CO-4. Elaborate the principle and applications of potentiometric methods, X-ray crystallographic methods and thermo-analytical methods

CO-5. Discuss the instrumentation of the various modern analytical techniques

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4. Course Contents

Unit 1 **10 hours**

a. UV-Visible spectroscopy:

Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/Derivative spectroscopy.

b. IR spectroscopy:

Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier -Transform IR Spectrometer, Factors affecting vibration frequencies and Applications of IR spectroscopy, Data Interpretation.

c. Spectroflourimetry:

Theory of Fluorescence, Factors affecting fluorescence (Characteristics of drugs that can be analyzed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

d. Flame emission spectroscopy and atomic absorption spectroscopy:

Principle, Instrumentation, Interferences and Applications.

Unit 2 **10 hours**

NMR spectroscopy:

Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy

Unit 3 **10 hours**

Mass Spectroscopy:

Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.

Unit 4 **10 hours**

Chromatography:

Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation, and applications of the following:

a) Thin Layer chromatography
b) High Performance Thin Layer Chromatography
c) Ion exchange chromatography
d) Column chromatography
e) Gas chromatography
f) High Performance Liquid chromatography
g) Ultra High-Performance Liquid chromatography
h) Affinity chromatography
i) Gel Chromatography

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Unit 5 **10 hours**

a.Electrophoresis:

Principle, Instrumentation, working conditions, factors affecting separation and applications of the following:

a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing

b.X ray Crystallography:

Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.

Unit 6 **10 hours**

a. Potentiometry:

Principle, working, Ion selective Electrodes and Application of potentiometry.

b. Thermal Techniques:

Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications.

Differential Thermal Analysis (DTA): Principle, instrumentation and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantages and disadvantages, pharmaceutical applications.

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	-	2	2	-	1	-	1	-	-	1	3	1	-	-
CO-2	3	-	-	2	-	1	-	1	-	-	1	3	2	-	-
CO-3	3	-	2	2	-	1	-	1	-	-	1	3	2	-	1
CO-4	3	-	1	2	-	1	-	1	-	-	1	3	2	-	1
CO-5	3	-	1	2	-	-	-	1	-	-	1	3	2	-	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

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6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		55
Demonstrations		02
1.Demonstration using Videos	2	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		03
1. Case Study Presentation	00	
2. Guest Lecture	01	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	01	
5. Group Discussions	01	
6. Discussing Possible Innovations	00	
Written Examination		5
Total Duration in Hours		**65**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment is presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			**Component 2: SEE (75% Weightage)**
Subcomponent	**SC1**	**SC2**	**SC3**	
Subcomponent Type	**Attendance**	**Student – Teacher Interaction**	**Sessional Exam**	**Semester End Examination 75 Marks**
Maximum Mark	**8**	**2**	**15**	
CO-1		X	X	X
CO-2		X	X	X
CO-3		X	X	X
CO-4		X	X	X
CO-5		X	X	X

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The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher interaction:02 marks

Based on interaction with the course leader/s the students will be evaluated

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, at the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marks reduced to 15 will be the marks scored in the Sessional Examination

Component - 2: 75 marks

A 3-hour duration Semester End Examination will be conducted for maximum marks of 75.
Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities is limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, classroom behavior with peers, Student-Teacher interaction

9. Course Resources

a. Class Notes

b. Essential Reading

1. Silverstein, RM. Webster, FX (2004) Spectrometric identification of organic compounds,6th Edition, New York: John Wiley and Sons.
2. Mendham, J. Denny, RC. Barnes, JD. Thomas, M. (2008). Vogel's Textbook of quantitative chemical analysis. 6th Edition, New Delhi: Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in South Asia.
3. Willard, HH. Merritt, LL. Dean, JA. Settle, FA. Instrumental methods of analysis.7thEdition, New Delhi: CBS Publishers and Distributors.
4. Beckett, AH. Stenlake, JB. (2004) Practical Pharmaceutical Chemistry. Vol. I & II. London: The Athlon Press of the University of London.
5. Kemp, W. (2008) Organic spectroscopy. 3rdEdition. New York: Palgrave.
6. Skoog, DA. West, DM. Hollen, FG. Fundamentals of Analytical chemistry, 6thEdition, USA: Saunders college publishing.
7. Munson, JW. (2001) Pharmaceutical Analysis-Modern methods-Part B. Vol II Marcel Dekker series. Mumbai, India: International Medical Book Distributors.
8. Sethi, PD. (1997) Quantitative Analysis of Drugs in Pharmaceutical formulation 3rd Edition, New Delhi: CBS Publishers.
9. Connors, KA. (1982) A textbook of pharmaceutical analysis. 3rd Edition, New York: John Wiley and Sons.

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c. Recommended Reading

1. Hoffmann, ED .Stroobant,V. (2001) Mass spectrometry: Principles and Applications. 2nd Edition. England: John Wiley and Sons Ltd.
2. Troy, D.B &Beringer, P. (2006) Remington's: The Science and Practice of Pharmacy. 22nd Edition. New York: Lipincott Williams and Wilkins.
3. United State of Pharmacopeial Convention, (2004). The United StatesPharmacopoeia-27(NF-22).Rockville: MD
4. Government of India, (2014) Indian Pharmacopoeia. New Delhi: Government of India.

d. Magazines and Journals

1. Indian Journal of Chemistry Section – B: Published by National Institute of Science Communication and Information Resources, Dr K S Krishnan Marg, New Delhi
2. Indian Journal of Pharmaceutical Sciences: Published on behalf of Indian Pharmaceutical Association by OMICS International, Hyderabad, India

e. Websites

1. www.sciencedirect.com
2. www.elsevier.com
3. www.pubmed.com

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Course Specifications: Advanced Pharmacognosy-I (Theory)

Course Title	Advanced Pharmacognosy-I (Theory)
Course Code	PGC502
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to expose students to various advanced aspects of Pharmacognosy and its utilization for the benefit of mankind. It imparts knowledge on the advances in cultivation, isolation of phytoconstituents, marine drugs, nutraceuticals and Pharmacovigilance of herbal drugs.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO-1.** Explain the advances in cultivation and production of crude drugs
- **CO-2.** Elaborate on the various phytochemical aspects of herbal drugs and recent advances in the field of Pharmacognosy
- **CO-3.** Appraise the medicinal importance of nutraceuticals and marine drugs
- **CO-4.** Discuss various aspects of Pharmacovigilance with respect to herbal drugs
- **CO-5.** Predict herb-drug, herb-herb interactions
- **CO-6.** Discuss recent trends and advances in cultivation, novel products of natural origin, Phytochemistry and Pharmacovigilance

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4. Course Contents

Unit 1 **12 Hours**

Plant drug cultivation: General introduction to the importance of Pharmacognosy in herbal drug industry, Indian Council of Agricultural Research, Current Good Agricultural Practices, Current Good Cultivation Practices, Current Good Collection Practices, Conservation of medicinal plants- Ex-situ and In situ conservation of medicinal plants.

Unit 2 **12 hours**

Marine natural products: General methods of isolation and purification, Study of Marine toxins, Recent advances in research in marine drugs, Problems faced in research on marine drugs such as taxonomical identification, chemical screening and their solution.

Unit 3 **12 hours**

Nutraceuticals: Current trends and future scope, Inorganic mineral supplements, Vitamin supplements, Digestive enzymes, Dietary fibres, Cereals and grains, Health drinks of natural origin, Antioxidants, Polyunsaturated fatty acids, Herbs as functional foods, Formulation and standardization of neutraceuticals, Regulatory aspects, FSSAI guidelines, Sources, name of marker compounds and their chemical nature, medicinal uses and health benefits of following i) Spirulina ii) Soya bean iii) Ginseng iv) Garlic v) Broccoli vi) Green and Herbal Tea vii) Flax seeds viii) Black cohosh ix) Turmeric.

Unit 4 **12 hours**

Phytopharmaceuticals: Occurrence, isolation and characteristic features (Chemical nature, uses in pharmacy, medicinal and health benefits) of following. a) Carotenoids – i) α and β - Carotene ii) Xanthophyll (Lutein) b) Limonoids – i) d-Limonene ii) α – Terpineol c) Saponins – Shatavarins d) Flavonoids – i) Resveratrol ii) Rutin iii) Hesperidin iv) Naringin v) Quercetin e) Phenolic acids- Ellagic acid f) Vitamins g) Tocotrienols and Tocopherols h) Andrographolide, Glycolipids, Guggulipids, Withanolides, Vascine, Taxol i) Miscellaneous

Unit 5 **12 hours**

Pharmacovigilance of drugs of natural origin: WHO and AYUSH guidelines for safety monitoring of natural medicine, Spontaneous reporting schemes for bio drug adverse reactions, bio drug-drug and bio drug-food interactions with suitable examples..

(Practical/Laboratory content (please mention if Lab content doesn't exist for this course): Selected experiments pertaining to this course were dealt in the course "Pharmacognosy Practical – I MPG105P")

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	1	2			1	1		1	2	3	1	1	2
CO-2	3	1	2	2				1			2	2	2		2
CO-3	3	1					1	1			2	1	2		2
CO-4	3	1	2					1			2	1			2
CO-5	3	2	2	1			2	1			2	2	2	1	2
CO-6	3	2	2	2				1			2	2	2	2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

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6. Course Teaching and LearningMethods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		50
Demonstrations		05
1.Demonstration using Videos	5	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	01	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	01	
5. Group Discussions	02	
6. Discussing Possible Innovations	01	
Written Examination		5
Total Duration in Hours		**65**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

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Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			Component 2: SEE (75% Weightage)
Subcomponent▶	SC1	SC2	SC3	
Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 75 Marks
Maximum Marks▶	8	2	15	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×
CO-4		×	×	×
CO-5		×	×	×
CO-6				×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher interaction: 02 Marks

Based on interaction with the course leader/s the students will be evaluated

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, oneat the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marks reduced to 15 will be the marks scored in the Sessional Examination.

Component - 2: 75 marks

A 3 hour duration Semester End Examination will be conducted for maximum marks of 75.
Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will beasked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

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The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, class room behavior with peers, Student-Teacher interaction

9. Course Resources

a. Class Notes

b. Essential Reading

1. Evans, W.C. (2009) Trease and Evans Pharmacognosy. 16th ed. New Delhi: Saunders Elsevier: Elsevier India Pvt Ltd.
2. Tyler, V.E. and Brady, R. (1988) Pharmacognosy. 8th ed. Philadelphia: Lea and Febiger.
3. Se-Kwon Kim (Ed). (2013) Marine Pharmacognosy. USA: CRC Press Taylor and Francis group.
4. Peach and Tracey, M.V. (1964) Modem Methods of Plant Analysis. Vol. I&II. USA: Springer.
5. Raphael and Ikan. (2005) Natural Products: A Lab Guide. 2nd ed. California: Academic Press.
6. Paul MDewick. (1998) Medicinal natural products (a biosynthetic approach). England: John Wiley & Sons Ltd.

7. Paul J. Scheuer. (1973) Chemistry of Marine Natural Products. Newyork: Academic Press.
8. Wallis, T.E. (1967) Text Book of Pharmacognosy. New Delhi : CBS publishers
9. Choudhary, R.D. (1996) Herbal Drug Industry. I[st] ed. New Delhi: Eastern Publisher.
10. Farooqui, A.A and Sreeramu, B.S. (2001) Cultivation of medicinal and aromatic crops. University Press.
11. Atal, C.K. and Kapur, B.M.(1982) Cultivation of Medicinal Plants. Jammu: RRL.
12. Atal C.K. and Kapur B.M. (1982) Cultivation and Utilization of Aromatic Plants. Jammu: RRL
13. Peter B. Kaufman. (1998) Natural Products from Plants. 1[st]ed. New York: CRC Press.
14. Recent Advances in Phytochemistry- Vol. 1&4: ScikelRuneckles- Appleton Century crofts.

c. Recommended Reading

1. AshutoshKar. (2003) Pharmacognosy and Pharmacobiotechnolog.I[st]ed. New Delhi: New Age International Publishers.
2. Kokate, C.K, Purohit, and Gokhale S.B. (2010) Text book of Pharmacognosy. 45[th]ed. New Delhi: NiraliPrakashan.
3. AYUSH, (2007) The Ayurvedic Pharmacopeia of India, New Delhi: Controller of publications, civil line.

d. Magazines and Journals

1. Pharma Buzz-Chandigarh, India, 3M Advertizers and Publishers
2. Pharmacognosy Magazine - Phcog.Net, Bangalore.
3. Indian Journal of Traditional Knowledge-CSIR, New Delhi
4. Indian Journal of Natural Products and resources-CSIR, New Delhi
5. Journal of Natural products – ACS Publications, Washington

e. Websites

1. www.sciencedirect.com
2. www.pubmed.com

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Course Specifications: Phytochemistry (Theory)

Course Title	Phytochemistry (Theory)
Course Code	PGC503
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

This course deals with phytochemical aspects of natural drugs and their biogenesis. It emphasizes on extraction, isolation, purification, identification and estimation with special reference to HPLC and HPTLC. Students are also provided knowledge on drug discovery and development.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Explain phytochemical aspects and biogenesis of various secondary metabolites
CO-2. Outline the importance of drug discovery
CO-3. Elucidate the structure of phytoconstituents
CO-4. Apply the principles of HPTLC and LCMS/GCMS in characterization of herbal extracts
CO-5. Analyse herbal extracts for the presence of phytoconstituents
CO-6. Discuss recent trends and advances in the field of Phytochemistry

4. Course Contents

Unit 1 **12 hours**

Biosynthetic pathways and Radio tracing techniques: Constituents & their Biosynthesis, Isolation, Characterization and purification with a special reference to their importance in herbal industries of following phyto-pharmaceuticals containing drugs: a) Alkaloids: Ephedrine, Quinine, Strychynine, Piperine, Berberine, Taxol, Vinca alkoloids. b) Glycosides: Digitoxin, Glycyrrhizin, Sennosides, Bacosides, Quercitin. c) Steroids: Hecogenin, guggulosterone and withanolides. d) Coumarin: Umbelliferone. e) Terpenoids: Cucurbitacins.

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Unit 2 **12 hours**

Drug discovery and development: History of herbs as source of drugs and drug discovery, the lead structure selection process, structure development, product discovery process and drug registration, Selection and optimization of lead compounds with suitable examples from the following source: artemesin, andrographolides. Clinical studies emphasizing on phases of clinical trials, protocol design for lead molecules

Unit 3 **12 hours**

Extraction and Phytochemical studies: Recent advances in extractions with emphasis on selection of method and choice of solvent for extraction, successive and exhaustive extraction and other methods of extraction commonly used like microwave assisted extraction, Methods of fractionation. Separation of phytoconstituents by latest CCCET, SCFE techniques including preparative HPLC and Flash column chromatography.

Unit 4 **12 hours**

Phytochemical finger printing: HPTLC and LCMS/GCMS applications in the characterization of herbal extracts. Structure elucidation of phytoconstituents.

Unit 5 **12 hours**

Structure elucidation of the following compounds by spectroscopic techniques like UV, IR, MS, NMR (1H, 13C) a. Carvone, Citral, Menthol b. Luteolin, Kaempferol c. Nicotine, Caffeine iv) Glycyrrhizin.

(Practical/Laboratory content (please mention if Lab content doesn't exist for this course): Selected experiments pertaining to this course were dealt in the course "Pharmacognosy Practical – I MPG105P")

5. **Course Map (CO-PO-PSO Map)**

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3			1		1		2			2	2			1
CO-2	3			1	1	2	1	2	1	1	2	1	2	2	2
CO-3	3	1	1	1			2				1	1	2		
CO-4	3	2	2	2		1	2		1	1	2	3	2	1	2
CO-5	3	2	3	2	1		2	1	1	2	2	2	2	1	2
CO-6	3		1	1	2	2	1	2	1	1	2	2		2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

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6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		50
Demonstrations		05
1.Demonstration using Videos	5	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	01	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	01	
5. Group Discussions	02	
6. Discussing Possible Innovations	01	
Written Examination		5
Total Duration in Hours		**65**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

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Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			Component 2: SEE (75% Weightage)
Subcomponent▶	SC1	SC2	SC3	
Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 75 Marks
Maximum Marks▶	8	2	15	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×
CO-4		×	×	×
CO-5		×	×	×
CO-6				×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher interaction: 02 marks

Based on interaction with the course leader/s the students will be evaluated

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, one at the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marks reduced to 15 will be the marks scored in the Sessional Examination

Component - 2: 75 marks

A 3 hour duration Semester End Examination will be conducted for maximum marks of 75.
Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.

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3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, class room behavior with peers, Student-Teacher interaction

9. Course Resources

a. Class Notes

b. Essential Reading

1. Tyler, V.E and Brady, R. (1988) Pharmacognosy, 8th ed. Philadelphia: Lea and Febiger.
2. Evans, W.C. (2009) Trease and Evans Pharmacognosy, 16th ed. New Delhi: Saunders Elsevier: Elsevier India Pvt Ltd.
3. Dewick, P.M. (1998) Medicinal natural products (a biosynthetic approach, 1st ed. England: John Wiley and sons Ltd.
4. Finar, I.L. (2002) Stereo chemistry and the chemistry of natural products.5th ed. India: Pearson Education (Singapore) Pvt Ltd. Indian branch
5. Beckett, A.H and Stenlake, J.B. (2004) Practical pharmaceutical chemistry. Part I and II 4th ed. New Delhi: CBS Publishers and Distributors.

6. Stahl Egon. (1969) Thin Layer Chromatography.2nd ed. New York: Springer.
7. Kaufman, P.B. (1998) Natural Products from Plants. 1st ed. New York: CRC press.
8. Charles, G., Smith James, T and Donnell, O. The Process of New Drug Discovery and Development. 2nd ed. USA: Informa Healthcare.
9. Bruneton, J. (1999) Pharmacognosy & Phytochemistry of Medicinal Plants. 2nd ed. New York: Interceptt Ltd.
10. Peach K & Tracey M.V. (1955) Modem Methods of Plant Analysis. Springer - Verlag Berlin Heidelberg.
11. Thomson, R.H. (1994) The Chemistry of Natural Products, Springer International Edn.
12. Wilson and Gisvolds. (2010) Text book of Organic Medicinal and Pharmaceutical Chemistry. 12th ed, Lippincott Williams & Wilkins.
13. Gurdeep Chatwal. (2002) Organic Chemistry of Natural Products. Vol. 1&2. India: Himalaya Publishing House.
14. Wagner, H &Bladt, S. (2007) Plant Drug Analysis. 2nd ed, Springer - Verlag Berlin Heidelberg.

c. Recommended Reading

1. Harborne, JB. (1998) Phytochemical methods-A guide to modern techniques of plant analysis. 3rd Ed. London: Chapman and Hall.
2. Rangari, VD. (2008) Pharmacognosy and Phytochemistry. Vol II. Nasik: Career publications
3. Sethi, PD. (2001) High performance liquid chromatography. 1st Ed. New Delhi: CBS publishers and Distributors

d. Magazines and Journals

1. Phytochemistry, Elsevier, U.K.
2. Planta Medica, Thieme Medical Publisher, Germany.
3. Journal of Ethno pharmacology, Elsevier, U.K.

e. Websites

1. www.sciencedirect.com
2. www.pubmed.com
3. www.phytochemistry.freeserve.co.uk

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Course Specifications: Industrial Pharmacognostical Technology (Theory)

Course Title	Industrial Pharmacognostical Technology (Theory)
Course Code	PGC504
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

This course is designed to impart knowledge on infrastructure and regulatory requirements of herbal drug industry. Students are taught quality control parameters for herbal drugs, concept of quality assurance and monograph analysis of crude drugs. It also emphasizes on patenting of natural products.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture:Tutorial:Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Outline infrastructure and quality regulations involved in herbal drug industries
CO-2. Explain the concept of quality assurance in herbal drug industry
CO-3. Design the monographs of herbal drugs
CO-4. Develop skills for the quality control of herbal drugs and formulations
CO-5. Discuss Intellectual property rights and regulatory affairs for herbal products
CO-6. Discuss the recent trends, quality and regulatory requirements of herbal industries

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4. Course Contents

Unit 1 **12 hours**

Herbal drug industry: Infrastructure of herbal drug industry involved in production of standardized extracts and various dosage forms. Current challenges in upgrading and modernization of herbal formulations. Entrepreneurship Development, Project selection, project report, technical knowledge, Capital venture, plantdesign, layout and construction. Pilot plant scale –up techniques, case studies of herbal extracts. Formulation and production management of herbals.

Unit 2 **12 hours**

Regulatory requirements for setting herbal drug industry: Global marketing management. Indian and international patent law as applicable herbal drugs and natural products. Export - Import (EXIM) policy, TRIPS. Quality assurance in herbal/natural drug products. Concepts of TQM, GMP, GLP, ISO-9000.

Unit 3 **12 hours**

Monographs of herbal drugs: General parameters of monographs of herbal drugs and comparative study in IP, USP, Ayurvedic Pharmacopoeia, Siddha and Unani Pharmacopoeia, American herbal pharmacopoeia, British herbal pharmacopoeia, WHO guidelines in quality assessment of herbal drugs.

Unit 4 **12 hours**

Testing of natural products and drugs: Herbal medicines - clinical laboratory testing. Stability testing of natural products, protocols

Unit 5 **12 hours**

Patents: Indian and international patent laws, proposed amendments as applicable to herbal/natural products and process. Geographical indication, Copyright, Patentable subject maters, novelty, non obviousness, utility, enablement and best mode, procedure for Indian patent filing, patent processing, grant of patents, rights of patents, cases of patents, opposition and revocation of patents, patent search and literature, Controllers of patents.

(Practical/Laboratory content (please mention if Lab content doesn't exist for this course): Selected experiments pertaining to this course were dealt in the course "Pharmacognosy Practical – I MPG105P")

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	2	2	2	2	2	2	1	1	3	3	1		2
CO-2	3		1	1	3	1	2	2	2	1	3	1		2	2
CO-3	3	1	1	1	1		1				2	1	1		
CO-4	3	1	2	2	3	2			1		3	2		2	2
CO-5	3	1	1	1	1	2	3	2	2	1	3	2	1	1	2
CO-6	3	2	2	2	2	2	2	2	2	1	3	2	1	2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		50
Demonstrations		05
1.Demonstration using Videos	5	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	01	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	01	
5. Group Discussions	02	
6. Discussing Possible Innovations	01	
Written Examination		5
Total Duration in Hours		**65**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			Component 2: SEE (75% Weightage)
Subcomponent▶	SC1	SC2	SC3	
Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 75 Marks
Maximum Marks▶	8	2	15	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×
CO-4		×	×	×

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CO-5		×	×	×
CO-6				×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher interaction: 02 Marks

Based on interaction with the course leader/s the students will be evaluated

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, oneat the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marks reduced to 15 will be the marks scored in the Sessional Examination

Component - 2: 75 marks

A 3 hour duration Semester End Examination will be conducted for maximum marks of 75.
Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the followingteaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, class room behavior with peers, Student-Teacher interaction

9. Course Resources

a. Class Notes

b. Essential Reading

1. Choudhary, R.D. (1996) Herbal Drug Industry. 1st ed. New Delhi: Eastern Publisher.
2. Agarwal, S.S and Paridhavi, M (2007) Herbal Drug Technology. 2nd ed. Universities Press.
3. Pulok K Mukherjee. (2005) Quality Control of Herbal Drugs. 1st ed. New Delhi: Business Horizons Pharmaceutical Publishers.
4. Anonymous. (1991).Guidelines for the Assessment of herbal medicines-WHO Report. Geneva.
5. Ananymous (2007) WHO guidelines for assessing quality of herbal medicines with reference to contaminants and residues. World Health Organization. Geneva.
6. Ananymous. (1999) WHO monographs of selected herbs. WHO
7. Rajpal, V. (2002) Standardization of Botanicals. Vol I. New Delhi: Eastern publishers.
8. Rajpal, V. (2005) Standardization of Botanicals. Vol II. New Delhi: Eastern publishers.
9. PDR of Herbal Medicines. (2000) 2nd ed. New Jersey: Medicinal Economic Company.

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c. Recommended Reading

1. Kokate, C.K., Purohit, Gokhale,S.B. (2010) Text book of Pharmacognosy. 45th ed. New Delhi: NiraliPrakashan.
2. Government of India. (1998, 2000) Indian Herbal Pharmacopoeia Vol.1&2, RRL:IDMA.
3. Rangari, V.D. (2008) Pharmacognosy and Phytochemistry. Vol II. Nasik: Career Publications.
4. Evans, W.C. (2009) Pharmacognosy. 16thed. New Delhi: Saunders Elsevier: Elsevier India Pvt Ltd.

d. Magazines and Journals

1. Indian Journal of Natural Products and resources- NISCAIR, India.
2. Phytochemistry-Elsevier, Netherland.
3. Journal of Intellectual Property rights-NISCAIR, India.

e. Websites

1. www.sciencedirect.com
2. www.pubmed.com
3. www.phytochemistry.freeserve.co.uk

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Course Specifications: Pharmacognosy Practical- I

Course Title	Pharmacognosy Practical - I
Course Code	PGL505
Course Type	Core Practical Course
Department	Pharmacognosy and Pharmaceutical Chemistry
Faculty	Pharmacy

1. **Course Summary**

The aim of the course is to train the students in analytical method development for the identification and estimation of herbal extracts and formulation. Students are trained on phytochemical screening and handling instruments like HPTLC, HPLC. Students are also taught to formulate and standardize various herbal dosage forms.

2. **Course Size and Credits:**

Number of Credits	06
Credit Structure (Lecture: Tutorial: Practical)	0:0:12
Total Hours of Interaction	180
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy and Pharmaceutical chemistry
Total Course Marks	150 **Component -I: 50 Marks** A. Continuous Evaluation: 20 Marks A1. Attendance – 10 marks A2. Practical Record & Viva-voce – 10 marks B. Sessional Examination : 30 Marks (average of two) **Component –II : SEE: 100 Marks** Practical Examination : 100 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. **Course Outcomes (COs)**

After the successful completion of this course, the student will be able to:

CO-1. Analyze herbal extracts for the identification of phytoconstituents
CO-2. Perform TLC and HPTLC studies of Phytoconstituents
CO-3. Estimate phytoconstituents in herbal extracts and drugs
CO-4. Develop skills for the quality control of herbal drugs and formulation
CO-5.Formulate and evaluate different types of herbal dosage form

4. **Course Contents**

Analysis of Pharmacopoeial compounds of natural origin and their formulations by UV Vis Spectrophotometer
Analysis of recorded spectra of simple phytoconstituents
Experiments based on Gas Chromatography

Estimation of sodium/potassium by flame photometry
Development of fingerprint of selected medicinal plant extracts commonly used in herbal drug industry viz.
Ashwagandha, Tulsi, Bael, Amla, Ginger, Aloe, Vidang, Senna, Lawsonia by TLC/HPTLC method.
Methods of extraction
Phytochemical screening
Demonstration of HPLC- estimation of glycyrrhizin
Monograph analysis of clove oil
Monograph analysis of castor oil.
Identification of bioactive constituents from plant extracts
Formulation of different dosage forms and their standardization

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	3	1		1	1				2	3	1		1
CO-2	3	3	2	1		1	1			1	2	3	2		1
CO-3	3	3	2			1	2	2			2	3	2		1
CO-4	3	1	1	1	3	2	1	1	1	1	3	3	2	2	2
CO-5	3	3	3	2	1	2	1		1	2	3	3	3	1	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		20
Demonstrations		05
1.Demonstration using Videos	5	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		
Practical Work		150
1. Course Laboratory	150	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions		

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5. Group Discussions	02	
6. Discussing Possible Innovations	03	
Laboratory Examination		20
Total Duration in Hours		**200**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (33.33% Weightage)			**Component 2: SEE (66.66% Weightage)**
Subcomponent▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Attendance**	**Practical Records, Regular viva voce**	**Sessional Exam**	**Semester End Examination 100 Marks**
Maximum Marks▶	**10**	**10**	**30**	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×
CO-4		×	×	×
CO-5		×	×	×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 50 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	**Maximum Marks**
Attendance*	10
Practical Records, Regular viva voce	10
Total	20

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	**Marks**
95 – 100	**10**
90 – 94	**7.5**
85 – 89	**5**
80 – 84	**2.5**
Less than 80	**0**

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1B. Practical Records, Regular viva voce -10 marks

1C. Sessional exam: Two sessional examinations (each for 30 Marks with six hour duration) will be conducted. Average marks of the two sessionals will be computed for sessional examination marks.

Component - 2: 100 marks
Practical Examination: A practical exam shall be conducted for maximum marks 100 Marks with six hours of duration
Component 2 will be evaluated by course leader and external examiner.

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Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Laboratory interactions and self-study
2.	Understanding	Experiments conducted in laboratory
3.	Critical Skills	Experiments conducted in laboratory
4.	Analytical Skills	Inference of laboratory results
5.	Problem Solving Skills	Lab work and Examination
6.	Practical Skills	Face to face interactions and lab work
7.	Group Work	Laboratory Tasks
8.	Self-Learning	Practical Record writing and Examination
9.	Written Communication Skills	Viva voce and presentation of results
10.	Verbal Communication Skills	Presentation of results
11.	Presentation Skills	Laboratory Tasks
12.	Behavioral Skills	Practical Record writing and presentation of results
13.	Information Management	Group discussions and planning of Laboratory Tasks
14.	Leadership Skills	Presentation, Handling Questions during presentation, Interaction with peers presentations

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9. Course Resources

a. Essential Reading

1. Raphael and Ikan. (2005) Natural products: A lab guide. 2nd ed. California: Academic Press.
2. Harborne, J.B. (1998) Phytochemical methods-A guide to modern techniques of plant analysis. 3rd ed. London: Chapman and Hall.
3. Evans, W.C. (2009) Trease and Evans Pharmacognosy. 16th ed. New Delhi: Saunders Elsevier: Elsevier India Pvt Ltd.
4. Beckett, A.H and Stenlake, J.B. (2004) Practical pharmaceutical chemistry. Part I and II 4th ed. New Delhi: CBS Publishers and Distributors.
5. Stahl Egon. (1969) Thin Layer Chromatography.2nd ed. Newyork: Springer.
6. Kaufman, P.B. (1998) Natural Products from Plants. 1st ed. New York: CRC press.
7. Rajpal, V. (2002) Standardization of Botanicals. Vol I. New Delhi: Eastern publishers.
8. Rajpal, V. (2005) Standardization of Botanicals. Vol II. New Delhi: Eastern publishers.

b. Recommended Reading

1. Rangari, VD. (2008) Pharmacognosy and Phytochemistry. Vol II. Nasik: Career publications
2. Government of India.(1994) Pharmacopoeial Standards for Ayurvedic Formulations, Revised Ed. New Delhi: Central Council for Research in Ayurveda and Siddha.
3. Tyler VE and Brady R. (1988) Pharmacognosy. 8th ed. Philadelphia: Lea and Febiger.
4. Sethi, PD. (2001) High performance liquid chromatography. 1st ed. New Delhi: CBS publishers and Distributors.

c. Magazines and Journals

1. Journal of Pharmaceutical Investigations- Springer, Netherlands
2. Pharmacognosy Magazine-Medknow publication, Bangalore, India.
3. Journal of Chromatography A & B- Elsevier, Netherlands.

d. Websites

www.sciencedirect.com

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Course Specifications: Seminar and Assignment

Course Title	Seminar and Assignment
Course Code	PGS506
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. **Course Summary**

The course aims to instill critical thinking, analytical thinking and problem solving skills amongst students. Students are trained to refer to literature and present their thought process, justification either in the form of an essay or debate as a concise report. Students are trained for collaborative learning while analyzing and also solving problems. They are exposed to citation, referencing and paraphrasing. Students are also exposed in communicating the collected information/literature to present and defend their accomplishment

2. **Course Size and Credits:**

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	7:0:0
Total Hours of Interaction	105
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 Marks Component -1: Assignment = 60 Marks Report evaluated individually for 15 marks for 4 theory Courses in the semester. Component -2: Seminar = 40 Marks Assignment presentation evaluated individually for 10 marks for 4 theory Courses in the semester
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. **Course Outcomes (COs)**

After the successful completion of this course, the student will be able to:

CO-1. Develop critical thinking, analytical thinking and problem solving skills
CO-2. Demonstrate the ability to synthesize the report
CO-3. Develop academic report with appropriate citation and referencing style
CO-4. Communicate the contents of the report to the panel
CO-5. Defend the contents of the report in the panel

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4. **Course Contents**

Critical review of the literature on the given assignment
Writing and Communication skills
Citation and referencing styles- Harvard referencing style
Plagiarism review
Analytical and problem solving skills
Practical/Laboratory content: NA

5. **Course Map (CO-PO-PSO Map)**

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	3		2						2			2	2
CO-2	2		1		1			3			3			2	2
CO-3	2		2		1			3			3			2	2
CO-4	2		2		1			3			3			2	2
CO-5	2		2		1			3			3			1	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. **Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		10
1.Demonstration using Videos		
2. Demonstration using Physical Models / Systems	5	
3. Demonstration on a Computer	5	
Tutorials		
Practical Work		15
1. Course Laboratory	5	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen	10	
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		50
1. Case Study Presentation	10	
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions	10	
5. Group Discussions		
6. Discussing Possible Innovations	30	
Presentation		20
Total Duration in Hours		**105**

7. Course Assessment and Reassessment

The details of the components of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table

	Component 1: Assignment (60% Weightage)	Component 2: Seminar (40% Weightage)
Subcomponent ▶	SC1	SC2
Subcomponent Type ▶	Assignment	Seminar
Maximum Marks ▶	60	40
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X
CO-5		X

Component - 1:Assignment = 60Marks [4 courses of 15 marks each] One word processed assignment submitted for 4 theory courses in a semester will be evaluated by Course Leaders for a maximum of 15 marks each.

Component - 2:Seminar = 40Marks [4 courses of 10 marks each] Presentation on submitted assignments will be evaluated by Course Leaders for a maximum of 10 marks each.

Marks awarded for four individual Courses (Assignment -15 marks & Seminar – 10 marks) will be summed and calculated for the total marks obtained for a maximum marks of 100.

The assessment questions are set to test the learning outcomes. In each component a certain learning outcomes are assessed. The following table illustrates the focus of learning outcome in each component assessed:

Both components will be evaluated by concerned course leader/s.

Reassessment

1. If a student fails in the course ,it is considered fail and he or she has to earn the credits in the make up opportunity and re-registration to the course is required.
2. The maximum number of such opportunities is limited as per the academic regulations governing this programme.

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8. **Meeting Programme Objectives through Course Objectives**

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Readings and findings
2.	Understanding	Readings and findings
3.	Critical Skills	Literature review
4.	Analytical Skills	Data collection
5.	Problem Solving Skills	Data analysis
6.	Practical Skills	Writing & presentation
7.	Group Work	Data analysis
8.	Self-Learning	Readings and findings
9.	Written Communication Skills	Assignment Processing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interactions
13.	Information Management	Paper Writing
14.	Leadership Skills	Effective management of learning, time management, achieving the learning

9. **Course Resources**

a. Essential Reading

1. Research articles
2. Relevant text books
3. Visits to websites relevant to assignment problem

b. Recommended Reading - NA

c. Magazines and Journals

Relevant Magazines and Journals pertaining to assignment

d. Websites

1. Specific web information pertaining to assignment
2. www.pubmed.com

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SEMESTER II

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Course Specifications: Medicinal Plant Biotechnology (Theory)

Course Title	Medicinal Plant Biotechnology (Theory)
Course Code	PGC507
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. **Course Summary**

The course is designed to impart knowledge on the area of plant genetics and biotechnology with reference to medicinal plants. The student is introduced to the recent advances in medicinal plant biotechnology for obtaining and improving the quality of natural products. It also provides knowledge on fermentation technology.

2. **Course Size and Credits:**

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. **Course Outcomes (COs)**

After the successful completion of this course, the student will be able to:

CO-1. Explain basic aspects of plant genetics and significance of transgenic plants
CO-2. Outline the role of PCR in genome analysis and fermentation technology
CO-3. Analyze the principles of different tissue culture techniques to enhance the production of secondary metabolites
CO-4. Illustrate the applications of Recombinant DNA technology
CO-5. Discuss the aspects of immobilization techniques and secondary metabolite production
CO-6. Discuss the recent trends and advances in genetics, plant tissue culture and fermentation technology

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4. **Course Contents**

Unit 1 12 Hours

Introduction to Plant biotechnology: Historical perspectives, prospects for development of plant biotechnology as a source of medicinal agents. Applications in pharmacy and allied fields. Genetic and molecular biology as applied to pharmacognosy, study of DNA, RNA and protein replication, genetic code, regulation of gene expression, structure and complicity of genome, cell signaling, DNA recombinant technology

.

Unit 2 **15 hours**

Different tissue culture techniques: Organogenesis and embryogenesis, synthetic seed and monoclonal variation, Protoplast fusion, Hairy root multiple shoot cultures and their applications. Micro propagation of medicinal and aromatic plants. Sterilization methods involved in tissue culture, gene transfer in plants and their applications.

Unit 3 **15 hours**

Immobilisation techniques & Secondary Metabolite Production: Immobilization techniques of plant cell and its application on secondary metabolite Production. Cloning of plant cell: Different methods of cloning and its applications. Advantages and disadvantages of plant cell cloning. Secondary metabolism in tissue cultures with emphasis on production of medicinal agents. Precursors and elicitors on production of secondary metabolites .

Unit 4 **13 hours**

Biotransformation and Transgenesis: Biotransformation, bioreactors for pilot and large scale cultures of plant cells and retention of biosynthetic potential in cell culture. Transgenic plants, methods used in gene identification, localization and sequencing of genes. Application of PCR in plant genome analysis.

Unit 5 **5 hours**

Fermentation technology: Application of Fermentation technology, Production of ergot alkaloids, single cell proteins, enzymes of pharmaceutical interest.

(Practical/Laboratory content (please mention if Lab content doesn't exist for this course): Selected experiments pertaining to this course were dealt in the course "Pharmacognosy Practicals – II MPG205P")

5. **Course Map (CO-PO-PSO Map)**

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	1	2			1	1		1	2	2	2		2
CO-2	3	1	1					1			2	1	2		2
CO-3	3	2	2	2				1		2	2	3	2		2
CO-4	3	1	1					1		1	2	1	2		2
CO-5	3	1	1	1				1			2	1	1		2
CO-6	3	2	2	2				1		2	2	2	2		2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

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6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		50
Demonstrations		05
1.Demonstration using Videos	5	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	01	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	01	
5. Group Discussions	02	
6. Discussing Possible Innovations	01	
Written Examination		5
Total Duration in Hours		**65**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			**Component 2: SEE (75% Weightage)**
Subcomponent▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Attendance**	**Student – Teacher Interaction**	**Sessional Exam**	**Semester End Examination 75 Marks**
Maximum Marks▶	**8**	**2**	**15**	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×
CO-4		×	×	×
CO-5		×	×	×

CO-6				×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher interaction: 02 marks

Based on interaction with the course leader/s the students will be evaluated.

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, oneat the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marksreduced to 15 will be the marks scored in the Sessional Examination

Component - 2: 75 marks

A 3 hour duration Semester End Examination will be conducted for maximum marks of 75.
Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, class room behavior with peers, Student-Teacher interaction

9. Course Resources

a. Class Notes

b. Essential Reading

1. Gupta, P.K. (2004) Elements of Biotechnology. 1st ed. New Delhi: Rastogi Publications
2. Vyas, S.P. and Dixit V.K. (2007) Pharmaceutical Biotechnology. New Delhi: CBS Publishers
3. Razdan, M.K. (2003) Introduction to Plant Tissue Culture. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.
4. Ashutosh Kar. (2003) Pharmacognosy and Pharmacobiotechnology. I st ed. New Delhi: New Age International Publishers.
5. Evans, W.C. (2009) Trease and Evans Pharmacognosy. 16th ed. New Delhi: Saunders Elsevier: Elsevier India Pvt Ltd
6. Dixon. (1985) Plant tissue culture. Washington: DC Oxford Press.
7. Bhagwani. Plant tissue culture, vol 5, Elsevier Publishers.
8. Street, H.E. (1973) Plant tissue and cell culture. University of California press.
9. Purohit, S.S and Mathur, K.S. (2002) Biotechnology-Fundamentals and applications. 3rd revised edition. Agro-Bio Publishers.
10. Jeffrey, W. Pollard and John M Walker. Plant cell and tissue culture. Humana press.
11. Shargool, and Peter D Shargoal. Biotechnological applications to tissue culture. CKC Press.
12. CiddiVeerasham. (2008) Plant Biotechnology. I st ed. New Delhi: CBS Publishers

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and Distributors.
13. Reinert, J. and Yeoman, M.M. (1982) Plant cell and Tissue Culture – A Laboratory manual. Springer-Verlag Berlin Heidelberg.
14. John, H.D and Lorin, W.R. Experiments in plant tissue culture. Cambridge University Press.

c. Recommended Reading

1. Daan J Crommelin and Robert D Sindelar. (2002) Pharma Biotechnology. 2nd ed. New York: Taylor and Francis Group and Distributors.
2. Kokate, C.K, Purohit, and Gokhale S.B. (2010) Text book of Pharmacognosy. 45th ed. New Delhi: NiraliPrakashan

d. Magazines and Journals

1. Express-Kash Biotech, Ghaziabad, UP
2. Biotech Indian Journal of Biotechnology-CSIR, New Delhi
3. Biotechnology and Bioengineering -Wiley-V C H Verlag & co, Germany

e. Websites

1. www.sciencedirect.com
2. www.pubmed.com

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Course Specifications: Advanced Pharmacognosy II (Theory)

Course Title	Advanced Pharmacognosy II (Theory)
Course Code	PGC508
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to impart knowledge on the area of advances in Pharmacognosy. The students are exposed to the concepts of ethnobotany, ethnopharmacology, adulteration &deterioration, herbal remedies and their validations including analytical profiles. This course also emphasizes on the biological screening of herbal drugs.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Explain the efficacy, validation, Pharmacodynamic & Pharmacokinetic aspects of Herbal medicine products/therapies
CO-2. Outline the role of ethnobotany and ethnopharmacology in drug discovery and evaluation
CO-3. Discuss the various analytical profiles for the validation of herbal drugs
CO-4. Develop skills for the detection of adulteration and evaluation techniques
CO-5. Apply the various phyto-pharmacological screening methods for various biological properties
CO-6. Discuss recent trends and advancements in drug discovery related to natural products

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4. **Course Contents**

Unit 1 **12 Hours**

Herbal remedies – Toxicity and Regulations: Herbals vs Conventional drugs, Efficacy of Herbal medicine products, Validation of herbal therapies, Pharmacodynamic and Pharmacokinetic issues.

Unit 2 **12 Hours**

Adulteration and Deterioration: Introduction, Types of Adulteration/ Substitution of Herbal drugs, Causes and Measures of Adulteration, Sampling Procedures, determination of Foreign Matter, DNA Finger printing techniques in identification of drugs of natural origin, detection of heavy metals, pesticide residues ,phytotoxin, microbial contamination in herbs and their formulations.

Unit 3 **12 Hours**

Ethnobotany and Ethnopharmacology: Ethnobotany in herbal drug evaluation, Impact of Ethnobotany intraditional medicine, New development in herbals, Bio-prospecting tools for drug discovery, Role ofEthnopharmacology in drug evaluation, Reverse Pharmacology.

Unit 4 **12 Hours**

Analytical Profiles of herbal drugs: *Andrographis paniculata, Boswellia serata, Coleus forskholii, Curcuma longa, Embelica officinalis, Psoralea corylifolia*.

Unit 5 **12 Hours**

Biological screening of herbal drugs: Introduction and Need for Phyto-Pharmacological Screening, New Strategies for evaluating Natural Products, In vitro evaluation techniques for Antioxidants, Antimicrobial and Anticancer drugs. In vivo evaluation techniques for Anti-inflammatory, Antiulcer, Anticancer, Wound healing, Antidiabetic, Hepatoprotective, Cardio protective, Diuretics and Antifertility, Toxicity studies as per OECD guidelines.

(Practical/Laboratory content (please mention if Lab content doesn't exist for this course): Selected experiments pertaining to this course were dealt in the course "Pharmacognosy Practical – II MPG205P)

5. **Course Map (CO-PO-PSO Map)**

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3		1	1	1	1	1	1	1		2	1	2	1	1
CO-2	3		1	1	1	2	1	2	3	2	2	2	1	1	1
CO-3	3			1		1	1	1			1	1	1		1
CO-4	3	2	3	2	2	1	1	1		1	2	2	2	1	1
CO-5	3	2	3	2	1	1	1	1		1	1	2	2	1	1
CO-6	3		1	1	1	1		1	1	1	2	1	1	1	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

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6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		50
Demonstrations		05
1.Demonstration using Videos	5	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	01	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	01	
5. Group Discussions	02	
6. Discussing Possible Innovations	01	
Written Examination		5
Total Duration in Hours		**65**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			Component 2: SEE (75% Weightage)
Subcomponent▶	SC1	SC2	SC3	
Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 75 Marks
Maximum Marks▶	8	2	15	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×
CO-4		×	×	×
CO-5		×	×	×

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CO-6				×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher interaction – 02 marks

Based on interaction with the course leader/s the students will be evaluated

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, one at the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marks reduced to 15 will be the marks scored in the Sessional Examination

Component - 2: 75 marks

A 3 hour duration Semester End Examination will be conducted for maximum marks of 75.
Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, class room behavior with peers, Student-Teacher interaction

9. Course Resources

a. Class Notes

b. Essential Reading

1. Pushpangadam, P. Ulf Nyman., George. V. (1995) Glimpses of Indian EthnoPharmacology. Thiruvananthapuram: Tropical Botanic Garden & Research Institute.
2. Raphael Ikan. (1991) Natural products: A lab guide. 2nd ed. New York: Academic Press Inc.
3. Evans, W.C. (2009) Trease and Evans Pharmacognosy. 16th ed. New Delhi: Saunders Elsevier: Elsevier India Pvt. Ltd.
4. Tyler, VE and Brady, R. (1988) Pharmacognosy. 8th ed. Philadelphia: Lea and Febiger.
5. Peach. K, Tracey, M.V. (1955, 1956) Modem Methods of Plant Analysis- Vol. I & II, New York: Springer Publishers.
6. Choudhary, R.D. (1996) Herbal Drug Industry. 1st ed. New Delhi: Eastern Publishers.
7. Kokate, C.K. Purohit and Gokhale, S.B. (2010) Text book of Pharmacognosy. 45th ed. New Delhi: NiraliPrakashan.
8. Wallis, T.E. (1985) Text Book of Pharmacognosy. 5th ed. London: J & A Churchill Ltd.
9. Pulok K Mukherjee. (2005) Quality Control of Herbal Drugs. 1st ed. New Delhi: Business Horizons Pharmaceutical Publishers.
10. Anonymous. (2002) Indian Herbal Pharmacopoeia. Vol. 1 & 2. IDMA: Mumbai.
11. Rangari, V.D. (2008) Pharmacognosy and Phytochemistry. 2nd ed. Vol II. Nasik: Career Publications.
12. Wagner, H. and Bladt, S. (1996) Plant drug analysis. 2nd ed. Berlin: Springer.

13. Rajpal, V. (2006) Standardization of Botanicals. Testing and extraction methods of medicinal herbs. New Delhi: Eastern Publishers.

c. Recommended Reading

1. Gerald Vogel, H. (2002) Drug Discovery and Evaluation in Pharmacological Assays. 2nd ed. Berlin: Springer -Verlag.
2. Anonymous. (2004) WHO guidelines on Safety Monitoring of Herbal Medicines in Pharmacovigilance Systems. Geneva: WHO.
3. Turner Robert A. (1965) Screening Methods in Pharmacology. Volume I and II. New York: Academic Press.

d. Magazines and Journals

1. Journal of Ethnopharmacology – Elsevier: Netherland.
2. Indian Journal of Natural Products and Resources – NISCAIR: New Delhi.
3. Indian Journal of Pharmacology – Medknow Publications: Mumbai.
4. Phytochemistry - Elsevier: Netherland.
5. Journal of Natural Remedies –Informatics Publishing Limited: Bengaluru.

e. Websites

1. www.sciencedirect.com
2. www.pubmed.com

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Course Specifications: Indian Systems of Medicine (Theory)

Course Title	Indian Systems of Medicine (Theory)
Course Code	PGC509
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. **Course Summary**

This course is designed to impart students the knowledge on concepts and principles of Indian systems of medicine. This course emphasizes on various preparations of Indian systems of medicine; quality assurance, clinical research and the safety of herbal medicines.

2. **Course Size and Credits:**

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. **Course Outcomes (COs)**

After the successful completion of this course, the student will be able to:

CO-1. Explain the basic principles of Indian systems of medicine

CO-2 .Outline the preparation of some of the important class of formulations used in Indian system of medicines

CO-3. Analyze the quality assurance aspects of GAP, GLP and GMP involved in Indian systems of medicine formulation industry

CO-4. Appraise the importance of Traditional Knowledge Digital Library

CO-5. Discuss the role, responsibilities and contributions by AYUSH, ISM, CCRAS, CCRS,CCRH, CCRU

CO-6. Discuss the concepts of traditional systems of medicine, their development and various formulations including their manufacture, quality control and safety monitoring.

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4. Course Contents

Unit 1 **12 hours**

Fundamental concepts of Ayurveda, Siddha, Unani and Homoeopathy systems of medicine: Different dosage forms of the ISM. Ayurveda: Ayurvedic Pharmacopoeia, Analysis of formulations and bio crude drugs with references to: Identity, purity and quality. Siddha: Gunapadam (Siddha Pharmacology), raw drugs/Dhatu/Jeevam in Siddha system of medicine, Purification process (Suddhi).

Unit 2 **12 hours**

Naturopathy, Yoga and Aromatherapy practices

a) Naturopathy - Introduction, basic principles and treatment modalities.

b) Yoga - Introduction and Streams of Yoga. Asanas, Pranayama, Meditations and Relaxation techniques.

c) Aromatherapy – Introduction, aroma oils for common problems, carrier oils.

Unit 3 **12 hours**

Formulation development of various systems of medicine. Salient features of the techniques of preparation of some of the important class of Formulations as per Ayurveda, Siddha, Homeopathy and Unani Pharmacopoeia and texts. Standardization, Shelf life and Stability studies of ISM formulations.

Unit 4 **12 hours**

Schedule T – Good Manufacturing Practice of Indian systems of medicine Components of GMP (Schedule – T)and its objectives, Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records. Quality assurance in ISM formulation industry - GAP, GMP and GLP. Preparation of documents for new drug application and export registration. Challenges in monitoring the safety of herbal medicines: Regulation, quality assurance and control, National/Regional Pharmacopoeias.

Unit 5 **12 hours**

TKDL, Geographical indication Bill, Government bills in AYUSH, ISM, CCRAS, CCRS, CCRH, CCRU

(Practical/Laboratory content (please mention if Lab content doesn't exist for this course): Selected experiments pertaining to this course were dealt in the course "Pharmacognosy Practical – II MPG205P)

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3		1		1			1	1		1			1	
CO-2	3	2	1	2	1	1	2	2	1	1	2	1	2	1	1
CO-3	3	2	2	2	1	2	2		1	2	2	2	2	1	2
CO-4	3			2		2		2	2		2	2	1	2	2
CO-5	3		1		1	2		2	2		2	1	2	1	2
CO-6	3	1	1	2	1	2	2	2	2	2	2	2	2	1	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. **Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		50
Demonstrations		05
1.Demonstration using Videos	5	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	01	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	01	
5. Group Discussions	02	
6. Discussing Possible Innovations	01	
Written Examination		5
Total Duration in Hours		**65**

7. **Course Assessment and Reassessment**

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			Component 2: SEE (75% Weightage)
Subcomponent▶	SC1	SC2	SC3	
Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 75 Marks
Maximum Marks▶	8	2	15	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×

CO-4		×	×	×
CO-5		×	×	×
CO-6				×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher interaction – 02 marks

Based on interaction with the course leader/s the students will be evaluated

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, oneat the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marksreduced to 15 will be the marks scored in the Sessional Examination

Component - 2: 75 marks

A 3 hour duration Semester End Examination will be conducted for maximum marks of 75.
Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will beasked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. **Achieving COs**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, class room behavior with peers, Student-Teacher interaction

9. **Course Resources**

   a. **Class Notes**

   b. **Essential Reading**

1. Anonymous. (2004) Ayurvedic Pharmacopoeia. New Delhi: The Controller of Publications, Civil Lines, Govt. of India.
2. Panda, H. (2013) Hand Book on Ayurvedic Medicines. 2nd rev ed. New Delhi: National Institute of Industrial Research.
3. Kaviraj Nagendranath Sengupata. (1998) Ayurvedic System of Medicine. 2nd Rev. ed. New Delhi: Sri Satguru Publications.
4. Anonymous. Ayurvedic Pharmacopoeia. Formulary of Ayurvedic Medicines. Chennai: IMCOPS.
5. Anonymous. Homeopathic Pharmacopoeia. Formulary of Homeopathic Medicines, Chennai: IMCOPS.
6. Steven B. Kayne. (2006) Homeopathic Pharmacy: An introduction & Hand book. 2nd ed. New York: Churchill Livingstone.
7. Anonymous. (2002) Indian Herbal Pharmacopoeia. Mumbai: RRL, IDMA.
8. Anonymous. (1990) British Herbal Pharmacopoeia. UK: British Herbal Medicine Association.
9. Pulok K Mukharjee. (2003) GMP for Botanicals - Regulatory and Quality issues on Phytomedicine. 1st ed. New Delhi: Business Horizons.
10. Anonymous. (2001) Indian System of Medicine and Homeopathy in India. New Delhi: Planning and Evaluation Cell, Govt. of India.
11. Swaminthan, M. (1985) Essential of Food and Nutrition. Vol. 1. Bangalore: Bappco.

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12. Anita F. P. (1997) Clinical Dietitics and Nutrition. 4th ed. Delhi: Oxford University Press.
13. Yoga (2005) - The Science of Holistic Living by V.K.Yoga. Bangalore: Vivekananda YogaPrakashna Publishing.

c. Recommended Reading

1. Pharmacopoeial Standards for Ayurvedic Formulations (1994), Rev. ed. New Delhi: Central Council for Research in Ayurveda and Siddha, Govt.of India.
2. Ayurvedic Formulary of India (2003), 2nd Rev. ed. New Delhi: The Controller of Publications, Civil Lines, Govt. of India.
3. Tyler, VE and Brady, R. (1988) Pharmacognosy. 8th ed. Philadelphia: Lea and Febiger.

d. Magazines and Journals

1. International Journal of Advanced Ayurveda, Yoga, Unani, Siddha and Homeopathy – Cloud Publications: New Delhi.
2. Indian Journal of Traditional Knowledge – NISCAIR: New Delhi.
3. Journal of Ayurveda and Integrative medicine – WAF: Bangalore.

e. Websites

4. www.sciencedirect.com
5. www.pubmed.com

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Course Specifications: Herbal Cosmetics (Theory)

Course Title	Herbal Cosmetics (Theory)
Course Code	PGC510
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. **Course Summary**

This course aims to impart students the knowledge of preparation & standardization of herbal cosmetics. Students are exposed to various national and international standards applicable to herbal cosmeceuticals. This course also emphasizes on evaluation of herbal formulations and cosmetics as well as their market potential.

2. **Course Size and Credits:**

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. **Course Outcomes (COs)**

After the successful completion of this course, the student will be able to:

CO-1. Outline the economic aspects of various herbal/natural cosmetic preparations

CO-2. Explain the regulatory provisions and the principles of various herbal/natural cosmetic preparations

CO-3. Analyze commonly used raw materials and design of herbal cosmetic formulations.

CO-4. Develop the skill to formulate and evaluate herbal cosmetics

CO-5. Apply the test methods in the analysis of cosmetics, as per Drug and Cosmetics Act and also toxicity screening methods.

CO-6. Discuss the market potential of herbal cosmetics and various aspects including its raw materials, preparations and analysis.

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4. **Course Contents**

Unit 1 **12 hours**

Introduction: Herbal/natural cosmetics, Classification & Economic aspects:

Regulatory Provisions relation to manufacture of cosmetics: - License, GMP, offences & Penalties, Import &Export of Herbal/natural cosmetics, Industries involved in the production of Herbal/natural cosmetics.

Unit 2 **12 hours**

Commonly used herbal cosmetics, raw materials, preservatives, surfactants, humectants, oils, colors, and some functional herbs, preformulation studies, compatibility studies, possible interactions between chemicals and herbs, design of herbal cosmetic formulation.

Unit 3 **12 hours**

Herbal Cosmetics : Physiology and chemistry of skin and pigmentation, hairs, scalp, lips and nail, Cleansing cream, Lotions, Face powders, Face packs, Lipsticks, Bath products, soaps and baby product, Preparation and standardization of the following : Tonic, Bleaches, Dentifrices and Mouth washes & Tooth Pastes, Cosmetics for Nails.

Unit 4 **12 hours**

Cosmeceuticals of herbal and natural origin: Hair growth formulations, Shampoos, Conditioners, Colorants & hair oils, Fairness formulations, vanishing & foundation creams, anti-sun burn preparations, moisturizing creams, deodorants.

Unit 5 **12 hours**

Analysis of Cosmetics, Toxicity screening and test methods: Quality control and toxicity studies as per Drug and Cosmetics Act.

(Practical/Laboratory content (please mention if Lab content doesn't exist for this course): Selected experiments pertaining to this course were dealt in the course "Pharmacognosy Practical –II MPG205P)

5. **Course Map (CO-PO-PSO Map)**

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	1	1		1	1	1	1	2	2	3		1	2
CO-2	3		1		1	2	2	1	2		1	1	1	1	2
CO-3	3	1	1	1	1	2	2	2		1	2	1	1		1
CO-4	3	1	1	2	2	1	1	1		2	2	3	2	2	2
CO-5	3	1	1	2	1	1	2	1	1	1	1	1	2		1
CO-6	3	1	1		2	1	1	2	2	1	2	3		2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

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6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		50
Demonstrations		05
1.Demonstration using Videos	5	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	01	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	01	
5. Group Discussions	02	
6. Discussing Possible Innovations	01	
Written Examination		5
Total Duration in Hours		**65**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			Component 2: SEE (75% Weightage)
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Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 75 Marks
Maximum Marks▶	8	2	15	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×
CO-4		×	×	×

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CO-5		×	×	×
CO-6				×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher interaction: 02 marks

Based on interaction with the course leader/s the students will be evaluated

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, oneat the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marksreduced to 15 will be the marks scored in the Sessional Examination

Component - 2: 75 marks

A 3 hour duration Semester End Examination will be conducted for maximum marks of 75.
Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, class room behavior with peers, Student-Teacher interaction

9. Course Resources

a. Class Notes

b. Essential Reading

1. Panda, H. (2015) Herbal Cosmetics (Hand book). 3rd rev ed. New Delhi: Asia Pacific Business Press Inc.
2. Thomson, E.G. (1985) Modern Cosmetics. Mumbai: Universal Publishing Corporation.
3. Sharma, P.P. (2014) Cosmetics - Formulation, Manufacturing & Quality Control. 5th ed. New Delhi: Vandana Publications.
4. Supriya, K. B. (2005) Handbook of Aromatic Plants, 2nd ed. Jaipur: Pointer Publishers.
5. Skaria, P. (2007) Aromatic Plants (Horticulture Science Series). 1st ed. New Delhi: New India Publishing Agency.
6. Kathi Keville, and Mindy Green. (2008) Aromatheraphy (A Complete Guide to the Healing Art). 2nd ed. New Delhi: Sri Satguru Publications.
7. Chattopadhyay, P.K. (2000) Herbal Cosmetics & Ayurvedic Medicines (EOU). 3rd Rev ed. Delhi: National Institute of Industrial Research.
8. Balsam, M.S., and Edward Sagarin. (1972) Cosmetics Science and Technology. 2nd ed. New York: Wiley Interscience.

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c. **Recommended Reading**

1. Choudhary, R.D. (1996) Herbal Drug Industry. 1st ed. New Delhi: Eastern Publishers.
2. Agarwal, S.S., and Paridhavi, M. (2007) Herbal Drug Technology. 2nd ed. Universities Press.
3. Pulok K Mukherjee. (2005) Quality Control of Herbal Drugs. 1st ed. New Delhi: Business Horizons Pharmaceutical Publishers.
4. Anonymous. (1991) Guidelines for the Assessment of Herbal Medicines-WHO report. Geneva: WHO.
5. Anonymous. (2007) WHO guidelines for Assessing Quality of Herbal Medicines with reference to contaminants and residues. Geneva: WHO.
6. Poucher, W.A. (1991) Poucher's Perfumes, Cosmetics and Soaps. 9th ed. London: Chapman and Hall.
7. Mithal, B.M. (2005) A Hand book of Cosmetics. 1st ed. New Delhi: New age Internationals.

d. **Magazines and Journals**

4. International Journal of Cosmetic Science - John Wiley & Sons, Inc.: US.
5. Indian Journal of Natural Products and Resources – NISCAIR: New Delhi.
6. International Journal of Drug Formulation and Research – Bharti Publications: New Delhi.
7. Cosmetics – MDPI AG: Switzerland..

e. **Websites**

1. www.sciencedirect.com
2. www.pubmed.com

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Course Specifications: Pharmacognosy Practical - II

Course Title	Pharmacognosy Practical – II
Course Code	PGL511
Course Type	Core Practical Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to expose the students to the practical aspects of biotechnology, Phytochemistry, Traditional formulations and Herbal cosmetics as applied to pharmaceutical sciences through a series of experiments.

2. Course Size and Credits:

Number of Credits	06
Credit Structure (Lecture: Tutorial: Practical)	0:0:12
Total Hours of Interaction	180
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	150 **Component -I: 50 Marks** A. Continuous Evaluation: 20 Marks A1. Attendance – 10 marks A2. Practical Record & Viva-voce – 10 marks B. Sessional Examination : 30 Marks (average of two) **Component –II : SEE: 100 Marks** Practical Examination : 100 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Isolate and estimate DNA, RNA from different sources
CO-2. Select sterilization techniques to sterilize explants for the initiation of callus and suspension culture
CO-3. Formulate and evaluate herbal formulations and herbal cosmetics for its quality and purity
CO-4. Estimate secondary metabolites from natural sources
CO-5. Prepare and evaluate formulations of traditional system of medicine

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4. **Course Contents**

Isolation of nucleic acid from cauliflower heads
Isolation of RNA from yeast
Quantitative estimation of DNA
Immobilization technique
Establishment of callus culture
Establishment of suspension culture
Estimation of aldehyde contents of volatile oils
Estimation of total phenolic content in herbal raw material
Estimation of total alkaloid content in herbal raw materials
Estimation of total flavonoid content in herbal raw materials
Preparation and standardization of various simple dosage forms from Ayurvedic, Siddha, Homoeopathy and Unani formulary
Preparation of certain Aromatherapy formulations
Preparation of herbal cosmetic formulation such as lip balm, lipstick, facial cream, herbal hair and nail care products
Evaluation of herbal tablets and capsules
Preparation of sunscreen, UV protection cream, skin care formulations
Formulation & standardization of herbal cough syrup

5. **Course Map (CO-PO-PSO Map)**

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	3	1		1	1	2			2	3	2		1
CO-2	3	3	2	2		1	1	2			2	3	2		3
CO-3	3	3	2	1	2	1	1	2	1		3	3	3	1	3
CO-4	3	1	1	1		2	1	2			1	3	2		2
CO-5	3	2	2	2	2	2	1	2	1		3	3	3	1	3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. **Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		20
Demonstrations		05
1.Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		
Practical Work		150
1. Course Laboratory	150	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	

6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	
5. Group Discussions	02	
6. Discussing Possible Innovations	03	
Laboratory Examination		20
Total Duration in Hours		**200**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation				
	Component 1: CE (33.33% Weightage)			**Component 2: SEE (66.66% Weightage)**
Subcomponent▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Attendance**	**Practical Records, Regular viva voce**	**Sessional Exam**	**Semester End Examination 100 Marks**
Maximum Marks▶	10	10	30	
CO-1		×	×	×
CO-2		×	×	×
CO-3		×	×	×
CO-4		×	×	×
CO-5		×	×	×
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 50 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	10
Practical Records, Regular viva voce	10
Total	20

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1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	10
90 – 94	7.5
85 – 89	5
80 – 84	2.5
Less than 80	0

1B. Practical Records, Regular viva voce -10 marks

1C. Sessional exam: Two sessional examinations (each for 30 Marks with six hour duration) will be conducted. Average marks of thetwo sessionals will be computed for sessional examination marks.

Component - 2: 100 marks

Practical Examination: A practical exam shall be conducted for maximum marks 100 Marks with six hours ofduration.

Component 2 will be evaluated by course leader and external examiner.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Laboratory interactions and self-study
2.	Understanding	Experiments conducted in laboratory
3.	Critical Skills	Experiments conducted in laboratory
4.	Analytical Skills	Inference of laboratory results
5.	Problem Solving Skills	Lab work and Examination
6.	Practical Skills	Face to face interactions and lab work
7.	Group Work	Laboratory Tasks
8.	Self-Learning	Practical Record writing and Examination
9.	Written Communication Skills	Viva voce and presentation of results
10.	Verbal Communication Skills	Presentation of results
11.	Presentation Skills	Laboratory Tasks

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12.	Behavioral Skills	Practical Record writing and presentation of results
13.	Information Management	Group discussions and planning of Laboratory Tasks
14.	Leadership Skills	Presentation, Handling Questions during presentation, Interaction with peerspresentations

9. Course Resources

a. Lab Manual

b. Essential Reading

1. Raphael and Ikan. (2005) Natural products: A Lab Guide. 2nd ed. California: academic Press.
2. Harborne, J.B. (1998) Phytochemical Methods-A Guide to Modern Techniques of Plant Analysis. 3rd ed. London: Chapman and Hall.
3. Ayush. (2004) Ayurvedic Pharmacopoeia.New Delhi: the Controller of Publications, Civil Lines, Govt. of India.
4. Rajpal, V. (2002) Standardisation of Botanicals. Vol I. New Delhi: Eastern Publishers
5. Rajpal, V. (2005) Standardisation of Botanicals. Vol II. New Delhi: Eastern Publishers.
6. WHO. (1998). Quality Control Methods for Medicinal Plant material. Geneva
7. Ayush. (1998, 2000) Indian Herbal Pharmacopoeia. Vol.1 & 2. Jammu: RRL, IDMA.
8. Plummer David, T. (1992) An Introduction to Practical Biochemistry. 3rd ed. New York: Tata McGraw Hill.
9. Singh, SP. (2001) Practical Manual of Biochemistry. 4th ed. New Delhi: CBS Publishers.
10. Pulok K Mukherjee. (2005) Quality Control of Herbal Drugs. 1st ed. New Delhi: Business Horizons Pharmaceutical Publishers.
11. World Health Organization. (2007) WHO guidelines for assessing quality of herbal medicines with reference to contaminants and residues. Geneva.
12. Poucher, W.A. (1991) Poucher's perfumes, cosmetics and soaps. 9th ed. London: Chapman and Hall.
13. Mithal, B.M. (2005) A Hand book of cosmetics. 1st ed. New Delhi: New age Internationals.

c. Recommended Reading

1. Government of India. (1994) Pharmacopoeial Standards for Ayurvedic Formulations Revised Edition. New Delhi: Central Council for Research in Ayurveda and Siddha
2. Gupta, PK. (2004) Elements of Biotechnology. 1st ed. New Delhi: RastogiPublications

d. Magazines and Journals

1. Biotech Express- Kash Biotech, Ghaziabad, UP
2. Biotechnology and Bioengineering - Wiley-V C H Verlag & co, Germany
3. Fitoterapia- Elsevier, Netherland
4. Indian Journal of Biotechnology- CSIR, New Delhi
5. Phytochemistry-Elsevier, Netherland

e. Websites

1. www.sciencedirect.com
2. www.pubmed.com

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Course Specifications: Seminar and Assignment

Course Title	Seminar and Assignment
Course Code	PGS512
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The course aims to instill critical thinking, analytical thinking and problem solving skills amongst students. Students are trained to refer to literature and present their thought process, justification either in the form of an essay or debate as a concise report. Students are trained for collaborative learning while analyzing and also solving problems. They are exposed to citation, referencing and paraphrasing. Students are also exposed in communicating the collected information/literature to present and defend their accomplishment

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	7:0:0
Total Hours of Interaction	105
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	100 Marks Component -1: Assignment = 60 Marks Report evaluated individually for 15 marks for 4 theory Courses in the semester. Component -2: Seminar = 40 Marks Assignment presentation evaluated individually for 10 marks for 4 theory Courses in the semester
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Develop critical thinking, analytical thinking and problem solving skills
CO-2. Demonstrate the ability to synthesize the report
CO-3. Develop academic report with appropriate citation and referencing style
CO-4. Communicate the contents of the report to the panel
CO-5. Defend the contents of the report in the panel

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4. Course Contents

Critical review of the literature on the given assignment

Writing and Communication skills

Citation and referencing styles- Harvard referencing style

Plagiarism review

Analytical and problem solving skills

Practical/Laboratory content: NA

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	3		2						2			2	2
CO-2	2		1		1			3			3			2	2
CO-3	2		2		1			3			3			2	2
CO-4	2		2		1			3			3			2	2
CO-5	2		2		1			3			3			1	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		10
1.Demonstration using Videos		
2. Demonstration using Physical Models / Systems	5	
3. Demonstration on a Computer	5	
Tutorials		
Practical Work		15
1. Course Laboratory	5	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen	10	
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		50
1. Case Study Presentation	10	
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions	10	
5. Group Discussions		
6. Discussing Possible Innovations	30	
Presentation		20
Total Duration in Hours		**105**

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7. Course Assessment and Reassessment

The details of the components of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation		
	Component 1: CE (60% Weightage) Assignment (4 courses of 15 marks each)	Component 2: Seminar (40% Weightage)[4 courses of 10 marks each]
Maximum Marks▶	15 X4	10X4
CO-1	×	×
CO-2	×	×
CO-3	×	×
CO-4	×	×
CO-5	×	×

Component - 1:Assignment = 60Marks [4 courses of 15 marks each] One word processed assignment submitted for 4 theory courses in a semester will be evaluated by Course Leaders for a maximum of 15 marks each.

Component - 2: Seminar = 40Marks [4 courses of 10 marks each] Presentation on submitted assignments will be evaluated by Course Leaders for a maximum of 10 marks each.

Marks awarded for four individual Courses (Assignment -15 marks & Seminar – 10 marks) will be summed and calculated for the total marks obtained for a maximum marks of 100.

The assessment questions are set to test the learning outcomes. In each component a certain learning outcomes are assessed. The following table illustrates the focus of learning outcome in each component assessed:

Both components will be evaluated by concerned course leader/s.

Reassessment

1. If a student fails in the course, it is considered fail and he or she has to earn the credits in the makeup opportunity and re-registration to the Course is required.
2. The maximum number of such opportunities is limited as per the academic regulations governing this programme.

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8. **Meeting Programme Objectives through Course Objectives**

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Readings and findings
2.	Understanding	Readings and findings
3.	Critical Skills	Literature review
4.	Analytical Skills	Data collection
5.	Problem Solving Skills	Data analysis
6.	Practical Skills	Writing & presentation
7.	Group Work	Data analysis
8.	Self-Learning	Readings and findings
9.	Written Communication Skills	Assignment Processing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interactions
13.	Information Management	Paper Writing
14.	Leadership Skills	Effective management of learning, time management, achieving the learning

9. **Course Resources**

a. **Essential Reading**

1. Research articles
2. Relevant text books
3. Visits to websites relevant to assignment problem

b. **Recommended Reading– NA**

c. **Magazines and Journals**

Relevant Magazines and Journals pertaining to assignment

d. **Websites**

Specific web information pertaining to assignment

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SEMESTER III

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Course Specifications: Research Methodology and Biostatistics

Course Title	Research Methodology and Biostatistics
Course Code	PGF613
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

This course deals with the basic principles of research methodology and medical research. The students are trained on statistical tools and methodologies to solve problem arising in medical research. The course will also impart students the guidelines for quality maintenance of laboratory animals for conducting biomedical research.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	4:0:0
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy&Pharmacy Practice
Total Course Marks	100 **Component 1: 25 Marks** 1A: Attendance: 8 Marks 1B: Student-Teacher interaction: 2 Marks 1C: Sessional Exam: 15 Marks **Component 2 (SEE):** Semester End Examination: 75 Marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Identify the value, scope, objective and requirements of research
CO-2. Discuss the basic concept and importance of statistical analysis
CO-3. Outline the basic principles of medical research
CO-4. Summarize the guidelines for the maintenance of laboratory animals
CO-5. Translate pharmaceutical ethics into practice
CO-6. Apply the principles of medical research for the development of knowledge in the field of medicine

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4. Course Contents

Unit 1 **12 Hours**

General Research Methodology: Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.

Unit 2 **12 Hours**

Biostatistics: Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests(students "t" test, ANOVA, Correlation coefficient, regression), non-parametric tests (wilcoxan rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

Unit 3 **12 Hours**

Medical Research: History, values in medical ethics, autonomy, beneficence, non-maleficence, double effect, conflicts between autonomy and beneficence/non-maleficence, euthanasia, informed consent, confidentiality, criticisms of orthodox medical ethics, importance of communication, control resolution, guidelines, ethics committees, cultural concerns, truth telling, online business practices, conflicts of interest, referral, vendor relationships, treatment of family members, sexual relationships, fatality.

Unit 4 **12 Hours**

CPCSEA guidelines for laboratory animal facility: Goals, veterinary care, quarantine, surveillance, diagnosis, treatment and control of disease, personal hygiene, location of animal facilities to laboratories, anaesthesia, euthanasia, physical facilities, environment, animal husbandry, record keeping, SOPs personnel and training, transport of lab animals.

Unit 5 **12 Hours**

Declaration of Helsinki: History, introduction, basic principles for all medical research, and additional principles for medical research combined with medical care.

Practical/Laboratory content: NA

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3										2	3	2		
CO-2	3		3	2							2	2			1
CO-3	3		2				2					2			1
CO-4	3						2					2			
CO-5	2						3				1	2	2		2
CO-6	2		2	1			2	2				3	2		2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

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6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		55
Demonstrations		00
1.Demonstration using Videos		
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	00	
2. Guest Lecture	02	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	
5. Group Discussions	03	
6. Discussing Possible Innovations	00	
Written Examination		05
Total Duration in Hours		**65**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document. The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (25% Weightage)			Component 2: SEE (75% Weightage)
Subcomponent▶	SC1	SC2	SC3	
Subcomponent Type ▶	Attendance	Student – Teacher Interaction	Sessional Exam	Semester End Examination 75 Marks
Maximum Marks▶	8	2	15	
CO-1		X	X	X
CO-2		X	X	X
CO-3		X	X	X
CO-4		X	X	X
CO-5		X	X	X

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CO-6		X	X	X
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

Component - 1: 25 marks

The marks allocated for Continuous mode of internal assessment shall be awarded as per the scheme given below:

Criteria	Maximum Marks
Attendance*	8
Student-Teacher Interaction	2
Total	10

1A. Guidelines for the allotment of marks for attendance*

Percentage of Attendance Theory	Marks
95 – 100	8
90 – 94	6
85 – 89	4
80 – 84	2
Less than 80	0

1B. Student-Teacher Interaction: 02 marks

Based on interaction with the course leader/s the students will be evaluated.

1C. Sessional exam: Two sessional exams (each for 30 marks) of 1 hour duration will be conducted, at the end of 6th week and the other at the end of the 12th week. The average of the 2 sessional marks reduced to 15 will be the marks scored in the Sessional Examination

Component - 2: 75 marks

A 3 hour duration Semester End Examination will be conducted for maximum marks of 75.

Both components will be evaluated by concerned course leader/s.

Re-assessment

1. A student who fails to secure a minimum 50% in component-1 and 2 put together will be asked to register for Supplementary examination.
2. A student who has not satisfied the attendance requirement (not eligible for SEE) shall have to appear for Supplementary examination.
3. The maximum number of such opportunities is limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Student-Teacher interaction, Assignments
4.	Analytical Skills	Student-Teacher Interaction
5.	Problem Solving Skills	Class room lectures, Examination and Assignments
6.	Practical Skills	--
7.	Group Work	Assignments
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Examination, Student-Teacher Interaction
10.	Verbal Communication Skills	Presentations, Student-Teacher Interaction
11.	Presentation Skills	Class room activity, Assignment, Examination
12.	Behavioral Skills	Course work
13.	Information Management	Group discussions and presentations, preparation for examination and presentations
14.	Personal Management	Course work
15.	Leadership Skills	Handling questions during presentations, classroom behavior with peers, Student-Teacher interaction

9. Course Resources

a. Class notes

b. **Essential Reading**

1. Booth W. C, Colomb and Williams, G.G (2005) The Craft of Research, Chicago University Press.
2. Willium M.K and Trochim. (2003) Research Methods, 2nd ed, Biztantra Publications
3. Jonathan Grix. (2004) The Foundation of Research, Palgrave Study Guides
4. Bolton S and Bon C (2009) Pharmaceutical Statistics - Practical & Clinical Applications. 5th ed.New York: Marcel Dekker.
5. Jagadeesh, G., Sreekant Murthy, Gupta Y.K., Amitabh Prakash (2010) Biomedical Research, Lippincott Williams and Wilkins, 1st ed, New Delhi.
6. Gupta S.K. (2007) Basic principles of clinical Research and methodology, Institute of Clinical Research, India.
7. Ghosh M.N,(2008) Fundamentals of experimental Pharmacology, 4th ed, Hilton and company,Kolkata.

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c. Recommended Reading

1. Muth, J.E.D.(2006) Basic Statistics and Pharmaceutical Statistical Applications, 2nd ed. New Delhi:CRC Press.
2. J ones, D.S. (2002) Pharmaceutical Statistics. UK: Pharmaceutical Press.
3. Himanshi Joshi, (2015) An alternative approach to experimental Pharmacology. India: Himdeep publication.

d. Magazines and Journals

1. Indian Journal of Medical Research- ICMR, India.
2. The International Journal of Biostatistics-Berkeley Electronic Press, United States.
3. Indian Journal of Pharmacology- Medknow Publication, India

e. Websites

1. www.sciencedirect.com
2. www.pubmed.com

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Course Specifications: Journal Club

Course Title	Journal Club
Course Code	PGF614
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to equip a student to critically appraise the research article published in reputed journals. Students are trained for inquiry based learning and critical thinking skills. Students will also be trained to access journals adopting search engines and made to choose a topic of interest, collect relevant data, analyze and assess the quality of scientific paper and comment on the internal and external validity of the findings. Student will be able to base their opinion on evidence based literature

2. Course Size and Credits:

Number of Credits	01
Credit Structure (Lecture: Tutorial: Practical)	1:0:0
Total Hours of Interaction	15
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	**Total Marks: 25** **Component 1: 15 Marks** Report Evaluation: 15 marks **Component 2: 10 Marks** Presentation: 10 marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Select scientific articles from reputed journals
CO-2. Make use of search engines to select scientific articles
CO-3. Critically appraise scientific articles and assess the quality
CO-4. Develop a report on the critically appraised article
CO-5. Discuss the critically appraised article in appropriate forum

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4. Course Contents

- Select scientific articles from reputed journals
- Use search engines to select scientific articles
- Critically appraise scientific articles and assess the quality
- Develop a report on the critically appraised article
- Present the critically appraised article in appropriate forum

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3														
CO-2	1			3							3				
CO-3	3		3								3	3			3
CO-4	3	3	3		3		2	3			3			3	3
CO-5	3	3	2	3	3		2	3			3			3	3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		00
Demonstrations		00
1.Demonstration using Videos		
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		00
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		15
1. Case Study Presentation		
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions	10	
5. Group Discussions		
6. Discussing Possible Innovations	05	
Report preparation/ Report Evaluation & Presentation		05
Total Duration in Hours		**20**

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7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

Focus of COson each Component or Subcomponent of Evaluation		
	Component 1: Report evaluation (15% Weightage)	Component 2: Presentation (10% Weightage)
Subcomponent Type ▶	Report Evaluation	Presentation
Maximum Marks ▶	15	10
CO-1	X	
CO-2	X	
CO-3	X	
CO-4	X	
CO-5		X

Component - 1: 15 marks
The report submitted will be evaluated by a committee of examiners consisting of not less than 2 members in the Department appointed by the Head of the Department in consultation with the Academic Registrar of the Faculty

Component - 2: 10 marks
Evaluation of presentation by a committee of examiners consisting of not less than 2 members within the Department appointed by the Head of the Department in consultation with the Academic Registrar of the Faculty.

Re-assessment
1. If a student fails the course, it is considered fail and he /she have to re-register in the next opportunity. The marks awarded will be recapped to 50%.
2. The maximum number of such opportunities is limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Reading
2.	Understanding	Reading
3.	Critical Skills	Review on Seminar topic
4.	Analytical Skills	Comments on the reviewed topic
5.	Problem Solving Skills	---
6.	Practical Skills	---
7.	Group Work	---
8.	Self-Learning	Reading and Research
9.	Written Communication Skills	Paper writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interactions
13.	Information Management	Paper writing
14.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

Jennifer Raff, 2013, How to read and understand a scientific paper: A guide for non-scientists.

b. Recommended Reading

Relevant articles pertaining to the programme domain

c. Magazines and Journals

Relevant magazines and journals pertaining to the programme domain

d. Websites

1.www.sciencedirect.com
2. www.elsevier.com

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Course Specifications: Group Project

Course Title	Group Project
Course Code	PGF615
Course Type	Core Practical Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

This course will focus on the applications of appropriate methods and techniques involved in pharmaceutical Sciences using relevant University resources for definition and execution of the project. The group project will enable the students to apply the theoretical and practical aspects of pharmaceutical sciences as well as project management techniques taught during the programme. This course will enable the students to gain practical experience of working in a project mode, requiring interactions with the domain specialist to meet the technical challenges of the project undertaken.

2. . Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	0: 0: 8
Total Hours of Interaction	120
Number of Weeks in a Semester	15
Department Responsible	Department of Pharmacognosy, Pharmaceutical Chemistry, Pharmacology, Pharmaceutics, Pharmacy Practice
Total Course Marks	NA
Pass Criterion	Report Submission, Presentation & Exhibition of the project
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Demonstrate ability to work in a team and undertake a project in the area of Pharmaceutical Sciences
CO-2. Apply concepts of pharmaceutical sciences for executing the project
CO-3. Apply appropriate research methodology while formulating a project
CO-4. Design, develop and evaluate the project
CO-5. Defend the project, exhibit, make a presentation and document the work

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4. Course Contents

Unit 1
Need for undertaking a project, Project design, protocol / specifications design, methodology, analysis, product/design/model evaluation and presentation
Unit 2
Project Management, Time Management, Resource Management
Unit 3
Project Material indent, Project Development, Testing, Project Evaluation
Unit 4
Project Exhibition, Presentation
Unit 5
Team building, Team work, Leadership skills
Unit 6
Practical/Laboratory content: Interdepartmental laboratory work

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	2	2	1	1	1	2	1		1	3	3	2	1
CO-2	3	3	2	2	2	1	1	1	1		2	3	2	2	1
CO-3	3	3	3	3	2	1	1	1	1	1	1	3	3	2	1
CO-4	2	2	3	1	3	2	1	1	1	1	1	3	3	2	1
CO-5	3	3	3	3	2	1	1	3	3	1	1	3	3	2	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		00
Demonstrations		00
1.Demonstration using Videos	00	
2. Demonstration using Physical Models / Systems	00	
3. Demonstration on a Computer		
Tutorials		00
Practical Work		100
1. Course Laboratory	100	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		20

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1. Case Study Presentation	00	
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	10	
5. Group Discussions	10	
6. Discussing Possible Innovations	00	
Written Examination		10
Total Duration in Hours		**130**

7. Course Assessment and Reassessment

There are two components for assessment in this course

No.	Intended Learning Outcome	Type of Assessment	
		Component-I (Project Report and Viva-Voce)	**Component-II** (Exhibition and Presentation)
1	Work in a team and undertake a project in the area of Pharmaceutical Sciences	X	X
2	Apply concepts of pharmaceutical sciences for executing the project	X	X
3	Apply appropriate research methodology while formulating a project	X	X
4	Generate specifications, synthesize, analyse, develop and evaluate a project	X	X
5	Defend the project, exhibit, make a presentation and document the work	X	X

Component - 1: 50% weight
Project Report and Viva-Voce

Component - 2: 50% weight
Exhibition and Presentation
Both components will be moderated by a second examiner and the credits will be awarded after satisfying completion of the project work.

Reassessment

1. If a student fails in any one of the components, it is considered fail and the student should resubmit the project report or re-register to the course as applicable.
2. The maximum number of such opportunities is limited as per the academic regulations governing this course.

8. Meeting Programme Objectives through Course Objectives

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Group Project Work
2.	Understanding	Group Project Work
3.	Critical Skills	Group Project Work
4.	Analytical Skills	Group Project Work

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5.	Problem Solving Skills	Group Project Work
6.	Practical Skills	Group Project Work
7.	Group Work	Group Project Work
8.	Self-Learning	Group Project Work
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Group Project Work
13.	Information Management	Group Project Work
14.	Personal Management	Group Project Work
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

Assigned reading relevant to the group project.

b. Recommended Reading

Assigned reading relevant to the group project.

c. Magazines and Journals

Specific Journals relevant to group project work

d. Websites

Specific Websites relevant to group project work

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Course Specifications: Discussion / Synopsis Presentation

Course Title	Discussion / Synopsis Presentation
Course Code	PGF616
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

This course is designed to impart knowledge on the area of advances in targeted drug delivery systems. The coursed also focuses on molecular mechanistic approaches to the development of bio-available drugs and delivery systems.

2. Course Size and Credits:

Number of Credits	02
Credit Structure (Lecture: Tutorial: Practical)	2:0:0
Total Hours of Interaction	30
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	50
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Identify Research problem
CO-2. Discuss research problem with team and peers for solution
CO-3. Develop a protocol report on the critically appraised research problem
CO-4. Defend the critically appraised research problem in appropriate forum

4. Course Contents

Unit 1

Collect and appraise the relevant data from the scientific article for the chosen research problem.

Record the findings/data for solving research problem.

Develop a report on the critical observations and discuss with mentor /peer.

Presentation of the reports/findings in appropriate forum.

Practical/Laboratory content: NA.

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5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	3						3	2		3	1	3	2
CO-2	3	1	1		2	2		3			2	2	1	2	
CO-3	3	3	3	2			2		2	2	3	3	3	3	2
CO-4	3	1			3	3		3			2	2	1	2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		
Demonstrations		05
1.Demonstration using Videos		
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer	5	
Tutorials		05
Practical Work		00
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		25
1. Case Study Presentation		
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions	05	
5. Group Discussions		
6. Discussing Possible Innovations	20	
Synopsis preparation/ Presentation/ Discussion		05
Total Duration in Hours		**35**

7. Course Assessment and Reassessment

Synopsis to be evaluated along with the supporting documents by the Head of the Department/ Nominated Examiner by the HoD/Academic Registrar/Dean. Panel to evaluate and endorse. Dean of the Faculty to approve and submit to the University.

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Re-assessment

The remarks/queries/suggestions made by the examiner during scrutiny of the synopsis should be attended by the candidate in consultation with the Research Supervisor and must be re-submitted for evaluation process

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Reading
2.	Understanding	Reading
3.	Critical Skills	Review on research topic
4.	Analytical Skills	Comments on reviewed topic
5.	Problem Solving Skills	Research work, discussion
6.	Practical Skills	Research work, interactions
7.	Group Work	Discussion
8.	Self-Learning	Reading and Research
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interactions
13.	Information Management	Document writing and Presentation
14.	Personal Management	Presentation
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

1. Jennifer Raff, 2013, How to read and understand a scientific paper: A guide for non-scientists.

b. Magazines and Journals

1. International Journal of Pharmaceutics, Elsevier, Science Direct, Amsterdam
2. European Journal of Pharmaceutical Sciences, Elsevier, Science Direct, Amsterdam
3. Advanced Drug Delivery Reviews, Elsevier, Science Direct, Amsterdam
4. Journal of Controlled Release, Elsevier, Science Direct, Amsterdam
5. Drug Development and Industrial Pharmacy, Informa UK
6. Asian Journal of Pharmaceutical Sciences, Elsevier, Science Direct, Amsterdam
7. Indian Journal of Pharmaceutical Sciences, Indian Pharmaceutical Association, Mumbai

c. Websites

1.www.sciencedirect.com
2.www.elsevier.com

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Course Specifications: Research Work

Course Title	Research Work
Course Code	PGF617
Course Type	Core Practical Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to encourage students to develop skills in identification of a research problem in the chosen domain. This course also emphasizes the application of principles of research methodology ,preparation of research project proposal, research project management, execution of research project with effective technical documentation and presentation.

2. Course Size and Credits:

Number of Credits	14
Credit Structure (Lecture: Tutorial: Practical)	0:0:28
Total Hours of Interaction	420
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	**Total Marks :350** **Component -1: 250 Marks** Evaluation of Interim-Dissertation work Progress **Component-2:100Marks** Evaluation of Interim-Dissertation Presentation
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Appraise existing literature and formulate a research problem
CO-2. Compose and present a research proposal
CO-3. Test the hypothesis to achieve research objectives
CO-4. Propose new ideas/ methodologies or procedures for further improvement of the research problem
CO-5. Compile report with the research findings
CO-6. Defend the research findings in front of scholarly audience

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4. Course Contents

Information search, retrieval and review
Research problem identification
Project definition and project planning with objectives
Use of conceptual models/methodologies and frameworks
Problem solving and evaluation
Interpretations and drawing conclusions
Proposing ideas or methods for further work
Dissertation writing
Oral presentation

Practical/Laboratory content: Yes

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	2	2			3	2		1	3	3	2		2
CO-2	3	2	3	2	2	2	3	2		1	2	3	2	2	2
CO-3	3	2	3	2		2	3	2	3	1	3	3	2		2
CO-4	3	2	3	3	2	2	3	2	2	1	3	3	3	2	2
CO-5	3	2	2	3		2	3	2		1	3	3	3		2
CO-6	3	2	3	2	2	3	3	2	3	1	3	3	3	2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		00
Demonstrations		
1.Demonstration using Videos		
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		
1. Course Laboratory	380	
2. Computer Laboratory	20	
3. Engineering Workshop / Course/Workshop / Kitchen	00	400
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		
1. Case Study Presentation	00	
2. Guest Lecture	00	00
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	

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5. Group Discussions	10	
6. Discussing Possible Innovations	10	
Presentation Evaluation		05
Total Duration in Hours		425

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation		
	Component 1: CE (250 Marks)	**Component 2: SEE (100 Marks)**
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X
CO-5	X	X
CO-6	X	X

Component-1: Evaluation of Dissertation Book

Objectives	25 Marks
Review of literature	25 Marks
Methodology – Preliminary and on-going, evaluation parameters	100 Marks
Results and Discussion	100 Marks
Total	**250 Marks**

Component-2: Evaluation of Dissertation Presentation

Presentation of work	50 Marks
Communication skills	25 Marks
Question and answer skills	25 Marks
Total	**100Marks**

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The components will be evaluated by two examiners, one would be the Guide/ Supervisor (Internal Examiner) and the other External examiner would be the senior faculty member (within Department/Faculty for Component-1 & outside external to the University for Component-2.

However, the process of Dissertation evaluation in the IV semester should be carried out only after the student passes all the courses till III semester.

Re-assessment

1. If a student fails in the course, it is considered fail and re-registration on the course is required
2. The maximum number of such opportunities is limited as per the academic regulations governing this programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.
Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Dissertation
2.	Understanding	Dissertation
3.	Critical Skills	Dissertation
4.	Analytical Skills	Dissertation
5.	Problem Solving Skills	Dissertation
6.	Practical Skills	Dissertation
7.	Group Work	Dissertation
8.	Self-Learning	Dissertation
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Presentation
13.	Information Management	Report writing and Presentation
14.	Personal Management	Report writing and Presentation
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcome

9. Course Resources

a. Essential Reading

1. BarryWhite,2011, Mapping Your Thesis: The Comprehensive Manual of Theory and Techniques for Masters and Doctoral Research, ACER press,Australia.
2. Maximiano M.Rivera,Jr.and Roela Victoria Rivera ,2007, Practical Guide to Thesis an dissertation Writing, KATHA Publishing, Philippines.
3. Lecture sessions on Dissertation, Thesis preparation delivered by the concerned Head of the Dept.

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b. Recommended Reading

Relevant books pertaining to research problem

c. Magazines and Journals

Relevant magazines and journals pertaining to research problem

d. Websites

Relevant websites pertaining to research problem

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SEMESTER IV

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Course Specifications: Journal Club

Course Title	Journal Club
Course Code	PGF618
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to equip a student to critically appraise the research article published in reputed journals. Students are trained for inquiry based learning and critical thinking skills. Students will also be trained to access journals adopting search engines and made to choose a topic of interest, collect relevant data, analyze and assess the quality of scientific paper and comment on the internal and external validity of the findings. Student will be able to base their opinion on evidence based literature

2. Course Size and Credits:

Number of Credits	01
Credit Structure (Lecture: Tutorial: Practical)	1:0:0
Total Hours of Interaction	15
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	**Total Marks: 25** **Component 1: 15 Marks** Report Evaluation: 15 marks **Component 2: 10 Marks** Presentation: 10 marks
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student twill be able to:

CO-1. Select scientific articles from reputed journals
CO-2. Use search engines to select scientific articles
CO-3. Critically appraise scientific articles and assess the quality
CO-4. Develop a report on the critically appraised article
CO-5. Present the critically appraised article in appropriate forum

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4. Course Contents

- Select scientific articles from reputed journals
- Use search engines to select scientific articles
- Critically appraise scientific articles and assess the quality
- Develop a report on the critically appraised article
- Present the critically appraised article in appropriate forum

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3														
CO-2	1			3							3				
CO-3	3		3								3	3			3
CO-4	3	3	3		3		2	3			3			3	3
CO-5	3	3	2	3	3		2	3			3			3	3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		00
Demonstrations		00
1.Demonstration usingVideos		
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		00
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		10
1. Case Study Presentation		
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions	10	
5. Group Discussions		
6. Discussing Possible Innovations		
Report preparation/ Report Evaluation & Presentations		05
Total Duration in Hours		**15**

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7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

Focus of Cos on each Component or Subcomponent of Evaluation		
	Component 1: Report evaluation (15% Weightage)	Component 2: Presentation (10% Weightage)
Subcomponent Type ▶	Report Evaluation	Presentation
Maximum Marks ▶	15	10
CO-1	X	
CO-2	X	
CO-3	X	
CO-4	X	
CO-5		X

Component - 1: 15 marks
The report submitted will be evaluated by a committee of examiners consisting of not less than 2members within the Department appointed by the Head of the Department in consultation with the Academic Registrar of the Faculty

Component - 2: 10 marks
Evaluation of presentation by a committee of examiners consisting of not less than 2 members within the Department appointed by the Head of the Department in consultation with the Academic Registrar of the Faculty.
Both components will be moderated by a second examiner.

Re-assessment
1. If a student fails in the course, it is considered fail and he /she has to re-register in the next opportunity. The marks awarded will be recapped to 50%.
2. The maximum number of such opportunities are limited and as per the academic regulations governing this Programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Reading
2.	Understanding	Reading
3.	Critical Skills	Review on Seminar topic
4.	Analytical Skills	Comments on the reviewed topic
5.	Problem Solving Skills	---
6.	Practical Skills	---
7.	Group Work	---
8.	Self-Learning	Reading and Research
9.	Written Communication Skills	Paper writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interactions
13.	Information Management	Paper writing
14.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

Jennifer Raff, 2013, How to read and understand a scientific paper: A guide for non-scientists.

b. Recommended Reading

Relevant articles pertaining to the programme domain

c. Magazines and Journals

Relevant magazines and journals pertaining to the programme domain

d. Websites

1. www.science direct.com
2. www.elsevier.com

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Course Specifications: Discussion / Presentation

Course Title	Discussion / Presentation
Course Code	PGF619
Course Type	Core Theory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to enrich a student to critically solve the research problem/project proposal. Students will be trained to plan and execute the solution for the research problem through discussion and presentation with their mentor and peers using acquired knowledge, skills, evidence based literature and experience.

2. Course Size and Credits:

Number of Credits	03
Credit Structure (Lecture: Tutorial: Practical)	3:0:0
Total Hours of Class room and laboratory Interaction during the course	45
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Course Marks	75
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Identify the research problem
CO-2. Discuss research problem with team and peers for solution
CO-3. Develop a protocol report on the critically appraised research problem
CO-4. Defend the critically appraised research problem in appropriate forum

4. Course Contents

Collect and appraise the relevant data from the scientific article for the chosen research problem.

Record the findings/data for solving research problem.

Develop a report on the critical observations and discuss with mentor /peer.

Presentation of the reports/findings in appropriate forum

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5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3		3			3	2	3	2	2	2				3
CO-2	2	2	3	2	2	2	2	3	1	2	2			2	3
CO-3	3	3	3	3	2	2	2	3	2	2	3	3	3		3
CO-4	3	3	3	3	2	2	2	3	2	2	3	3	3	2	3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		00
Demonstrations		05
1.Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		
1. Solving Numerical Problems	05	05
Practical Work		25
1. Course Laboratory	00	
2. Computer Laboratory	20	
3. Engineering Workshop / Course/Workshop / Kitchen	05	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		10
1. Case Study Presentation	00	
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	10	
5. Group Discussions	00	
6. Discussing Possible Innovations	05	
Written Examination / Presentation		05
Total Duration in Hours		**50**

7. Course Assessment and Reassessment

Process:

Log book of the research work/Group Project / Colloquium presentation to be evaluated along with the supporting documents by the Head of the Department/ Nominated Examiner by the HoD/Academic Registrar/Dean along with the Supervisor. Panel to evaluate and endorse. Dean of the Faculty to approve and submit to the University

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Re-assessment

The remarks/queries/suggestions made by the examiner during discussion / colloquium should be attended by the candidate in consultation with the Research Supervisor and must be re-submitted for evaluation process.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Reading
2.	Understanding	Reading
3.	Critical Skills	Review on Seminar topic
4.	Analytical Skills	Comments on the reviewed topic
5.	Problem Solving Skills	Research work, discussion
6.	Practical Skills	Research work, Interactions
7.	Group Work	Discussion
8.	Self-Learning	Reading and Research
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interactions
13.	Information Management	Document writing and Presentation
14.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

Essential Reading

a. Research Papers

b. Visits to websites relevant research

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Course Specifications: Research Work

Course Title	Research Work
Course Code	PGF620
Course Type	Core Practical Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to encourage students to develop skills in the identification of a research problem in the chosen domain. This course also emphasizes the application of principles of research methodology, preparation of research project proposal, research project management, execution of research project with effective technical documentation and presentation.

2. Course Size and Credits:

Number of Credits	16
Credit Structure (Lecture: Tutorial: Practical)	0:0:31
Total Hours of Interaction	465
Number of Weeks in a Semester	15
Department Responsible	Pharmacognosy
Total Course Marks	**Total Marks :400** **Component -1: 250 Marks** Evaluation of Final Dissertation Book **Component-2:150Marks** Evaluation of Final Dissertation Presentation
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Appraise existing literature and formulate a research problem
CO-2. Compose and present a research proposal
CO-3. Test the hypothesis to achieve research objectives
CO-4. Propose new ideas/ methodologies or procedures for further improvement of the research problem
CO-5. Compile report with the research findings
CO-6. Defend the research findings in front of scholarly audience

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4. **Course Contents**

- Information search, retrieval and review
- Research problem identification
- Project definition and project planning with objectives
- Use of conceptual models/methodologies and frame works
- Problem solving and evaluation
- Interpretations and drawing conclusions
- Proposing ideas or methods for further work
- Dissertation writing
- Oral presentation

Practical/Laboratory content: Yes

5. **Course Map (CO-PO-PSO Map)**

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	2	2			3	2		1	3	3	2		2
CO-2	3	2	3	2	2	2	3	2		1	2	3	2	2	2
CO-3	3	2	3	2		2	3	2	3	1	3	3	2		2
CO-4	3	2	3	3	2	2	3	2	2	1	3	3	3	2	2
CO-5	3	2	2	3		2	3	2		1	3	3	3		2
CO-6	3	2	3	2	2	3	3	2	3	1	3	3	3	2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. **Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		00
Demonstrations		
1.Demonstration using Videos		
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Tutorials		00
Practical Work		430
1. Course Laboratory	430	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		30
1. Case Study Presentation	00	
2. Guest Lecture	00	
3. Industry / Field Visit	03	

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4. Brain Storming Sessions	00	
5. Group Discussions	00	
6. Discussing Possible Innovations	00	
Research Presentation		05
Total Duration in Hours		465

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Pharm Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2 or SC3), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation		
	Component 1: CE (500 Marks)	**Component 2: SEE (250 Marks)**
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X
CO-5	X	X
CO-6	X	X

Component-1: Evaluation of Dissertation Book

Methodology: Experimental work & Evaluation studies	50Marks
Results & Discussion	150Marks
Conclusion & final outcomes	50Marks
Total	**250Marks**

Component-2: Evaluation of Dissertation Presentation

Presentation of work	50 Marks
Communication skills	50Marks
Question and Answer skills	50 Marks
Total	**150Marks**

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The components will be evaluated by two examiners, one would be the Guide/ Supervisor (Internal Examiner) and the other External examiner would be the senior faculty member (within Department/Faculty for Component-1 & outside external to the University for Component-2.)

However the process of Dissertation evaluation in the IV semester should be carried out only after the student passes all the courses till III semester.

Re-assessment

3. If a student fails in the course, it is considered fail and re-registration to the course is required
4. The maximum number of such opportunities is limited as per the academic regulations governing this programme.

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.
Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Dissertation
2.	Understanding	Dissertation
3.	Critical Skills	Dissertation
4.	Analytical Skills	Dissertation
5.	Problem Solving Skills	Dissertation
6.	Practical Skills	Dissertation
7.	Group Work	Dissertation
8.	Self-Learning	Dissertation
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Presentation
13.	Information Management	Report writing and Presentation
14.	Personal Management	Report writing and Presentation
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcome

9. Course Resources

a. Essential Reading

1. Barry White, 2011, Mapping Your Thesis: The Comprehensive Manual of Theory and Techniques for Masters and Doctoral Research, ACER press, Australia.
2. Maximiano M.Rivera,Jr.and Roela Victoria Rivera, 2007, Practical Guide to Thesis and dissertation Writing, KATHA Publishing ,Philippines.
3. Lecture sessions on Dissertation, Thesis preparation delivered by the concerned Head of the Dept.

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b. Recommended Reading
Relevant books pertaining to research problem

c. Magazines and Journals
Relevant magazines and journals pertaining to research problem

d. Websites
Relevant websites pertaining to research problem

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Course Specifications: Participation/ Presentation in Research Forum

Course Title	Participation/ Presentation in Research Forum
Course Code	PGF621
Course Type	Mandatory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to make a student participate / present a research paper in a conference /seminar/workshop/symposium based on his/her research work specialization during his/her programme. The student is required to carry out original research, author a conference paper and present it. The student is also required to submit the paper to a conference approved by the department

2. Course Size and Credits:

Number of Credits	03 National level participation: 01 International level participation: 02
Credit Structure (Lecture: Tutorial: Practical)	NA
Total Hours of Interaction	NA
Number of Weeks in a Semester	NA
Department Responsible	Pharmacognosy
Total Course Marks	NA
Pass Criterion	As per the Academic Regulations
Attendance Requirement	NA

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Identify a suitable conference /research forum/workshop/symposium for Participation/presentation

CO-2. Take part in a conference/research forum/workshop/symposium of the chosen research domain

CO-3. Defend a research work in the conference/research forum of the chosen research domain

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4. Course Contents

Identification of suitable conference of research domain Participation in conference/symposium/workshop Presentation of research work in a conference

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2		1	2	2								1	
CO-2	3	3			3	3	2	3	2		1			2	1
CO-3	3	3	2	1		3	3	3		1	3	1	1	3	3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Self-Learning

Description	Number of credits
Participation in National Level Seminar/Conference / Workshop / Symposium / Training Programs (related to the specialization of the student)	01
Participation in outside India International Level Seminar /Conference/Workshop / Symposium / Training Programs (related to the specialization of the student)	02

7. Course Assessment and Reassessment

NA

Process: To be nominated by the Head of the department/Course Supervisor with the supporting documents. Panel to evaluate and endorse. Dean of the Faculty to approve the credit awarded and submit to the University.

Re-assessment

NA

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Reading and Research
2.	Understanding	Reading and Research
3.	Critical Skills	Literature Review
4.	Analytical Skills	Research
5.	Problem Solving Skills	Research
6.	Practical Skills	Research
7.	Group Work	Data analysis
8.	Self-Learning	Reading and Research
9.	Written Communication Skills	Paper writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interactions
13.	Information Management	Paper writing
14.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. **Essential Reading**

1. Research Papers
2. Visits to websites relevant to research

b.Websites

1. www.sciencedirect.com
2. www.elsevier.com

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Course Specification: Publication: National/International Journals

Course Title	Publication : National/ International
Course Code	PGF622
Course Type	Mandatory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The aim of this course is to make a student submit a research paper to a journal based on his/her research work during the programme. The student is required to carry out original research or explicit review of an article, author a journal paper for publication. The student is required to submit the research paper to a journal approved by the department.

2. Course Size and Credits

Number of Credits	Scopus indexed National Journal : 01 Scopus indexed International Journal : 02
Credit Structure (Lecture: Tutorial: Practical)	NA
Total Hours of Interaction	NA
Number of Weeks in a Semester	NA
Department Responsible	Pharmacognosy
Total Course Marks	NA
Pass Criterion	Acceptance of research work manuscript in a Scopus indexed journal
Attendance Requirement	NA

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Compose a research paper based on research and journal requirements
CO-2. Propose the research work for publication in a peer reviewed journal

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4. Course Contents

Identify a suitable journal for research publication

Collection, presentation and analysis of relevant research data

Preparation of manuscript according to the Journal instructions

Submission of manuscript for publication and further review

Practical/Laboratory content: NA

5. Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	1	2		1		3			2	2	2	1	2
CO-2	3	2	1	2		1		3	1	2	2	2	2	1	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Self-Directed

Description	Number of credits
Research/Review Publication in National Journals(Indexed in Scopus/Web of Science)	01
Research/Review Publication in International Journals(Indexed in Scopus/ Web of Science)	02

7. Course Assessment and reassessment

NA

Process: To be nominated by the Head of the department/Course Supervisor with the supporting documents .Panel to evaluate and endorse. Dean of the Faculty to approve the credit awarded and submit to the University.

Re-assessment

NA

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8. Achieving COs

S.No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Reading and Research
2.	Understanding	Reading and Research
3.	Critical Skills	Literature Review
4.	Analytical Skills	Research
5.	Problem Solving Skills	Research
6.	Practical Skills	Research
7.	Group Work	Data analysis
8.	Self-Learning	Reading and Research
9.	Written Communication Skills	Paper writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interactions
13.	Information Management	Paper writing
14.	Personal Management	Course work
14.	Leadership Skills	Effective management to learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

1. Research Papers/Publications from reputed journals
2. Visits to websites relevant to research

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Course Specifications: Academic/Research Award

Course Title	Academic/Research Award
Course Code	PGF623
Course Type	Mandatory Course
Department	Pharmacognosy
Faculty	Pharmacy

1. Course Summary

The students with extraordinary academic achievement/ research accomplishment are provided an opportunity to utilize in a State/National / International awarding agencies or platforms as a means to further encourage sound scholarship. The students are trained to develop required documents like statement of purpose and resume and also developing concept note / abstract of their accomplishment.

2. Course Size and Credits:

Number of Credits	State/National agency awarded : 01 International agency awarded : 02
Credit Structure (Lecture: Tutorial: Practical)	NA
Total Hours of Interaction	NA
Number of Weeks in a Semester	NA
Department Responsible	Pharmacognosy
Total Course Marks	NA
Pass Criterion	Certificate of Excellence Award from the appropriate agency
Attendance Requirement	NA

3. Course Outcomes (COs)

CO-1. Compile the academic accomplishments /research findings in the form of report

CO-2. Identify an appropriate award granting agency to submit the report

CO-3. Develop required documents applicable to submit the academic accomplishment / research report

4. Course Contents

Skill of developing report on the content of their domain for academic achievement/ research accomplishment.
Technical communication skills for submission of the documents /records for the award.
Practical/Laboratory content: NA

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Bangalore-560054

Dean - Academics
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5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	3	1			1	2			1	3	1		
CO-2		3	3		1			3			1			3	2
CO-3		2				1		1		1	1				3

6. Course Teaching and Learning Methods

Self-directed

Description	Number of credits
Academic /Research award from State/National level agencies	01
Academic/Research award from International level agencies	02

7. Course Assessment and Reassessment

Process: To be nominated by Head of the department/ Course Supervisor with supporting documents. Constitution panel will evaluate and endorse the application. Dean of faculty to approve nomination and submit to the University.

8. Achieving COs

NA

9. Course Resources

a. Essential Reading

1. Richard J Stelzer, 2002, How to write winning personal statement of purpose for graduate and professional school, 3rd edition, United States of America.
2. Parker and Beth Brown, 2012, The Damn Good
3. Leah M. Akins and Jefferson H. Akins, 2009, Technical Report Writing Guidelines,
4. Dutchess Community College, Poughkeepsie, New York

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