**Name of Institute: Indus Institute of Sciences, Humanities & Liberal Studies**
**Name of Faculty: Dr. Chetana Deoghare**

**Course code: MCH0305**
**Course name: Drug Chemistry**
Pre-requisites: B. Sc. Chemistry

Credit points:

| L | T | P | C |
|---|---|---|---|
| 4 | 0 | 0 | 4 |

Offered Semester: III

**Course Coordinator (week's XX - XX)**
Full Name: Dr. Chetana Deoghare
Department with sitting location: Science and Humanities Department,
4th Floor, Bhanvar Building, Class Room No. 11.
Telephone: EXT: 3414
Email: chetanadeoghare.gd@indusuni.ac.in
Consultation times: Friday 3.20 pm to 4.15 pm

**Course Lecturer (week's xx - XX)**
Full name: Dr. Chetana Deoghare
Department with sitting location: Science and Humanities Department,
4th Floor, Bhanvar Building, Class Room No. 11.

Telephone: EXT: 3414
Email: chetanadeoghare.gd@indusuni.ac.in
Consultation times: Friday 3.20 pm to 4.15 pm

Students will be contacted throughout the session via mail with important information relating to this Course.

## Course Objectives

By participating in and understanding all facets of this Course a student will:

1. To study the basic principles of drug chemistry.
2. To study the drug metabolic pathways, adverse effect and therapeutic value of drugs.
3. To analyze the structural activity relationship of different class of drugs.
4. To learn the drug action and drug metabolism.
5. To understand the rational and irrational approach of drug discovery.
6. To analyze the chemistry of drugs with respect to their pharmacological activity.

## Course Outcomes (CO)

After the successful completion of the course, students will be able to;

1) Discuss the basic principles of drug chemistry [BT2].
2) Explain the drug metabolic pathways, adverse effect and therapeutic value of drugs [BT2].
3) Describe the structural activity relationship of different class of drugs [BT2].
4) Discuss the rational and irrational approach of drug discovery [BT2].
5) Analyse the chemistry of drugs with respect to their pharmacological activity [BT4].
6) Discuss the drug action and drug metabolism [BT2].

## Course Outline

(Key in topics to be dealt)

- **Basic principles of drug chemistry**
- **Rational design of enzyme inhibitors**
- **Pharmacokinetics**
- **Pharmacodynamics**
- **Drug Discovery**
- **Protein as–drug**
- **Enzymes as–drug target**
- **Receptor as–drug target**

## Method of delivery

(Face to Face lectures, Active Learning Techniques, Power Point Presentations)

## Study time

(How many hours per week including class attendance)

## CO-PO Mapping (PO: Program Outcomes)

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | | | | | | | | | | | | |

## Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

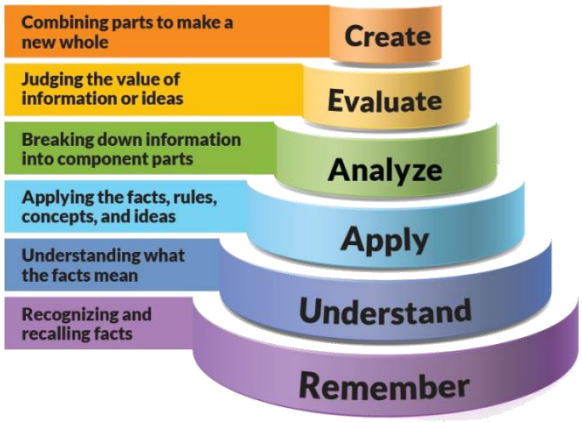


Figure 1: Blooms Taxonomy

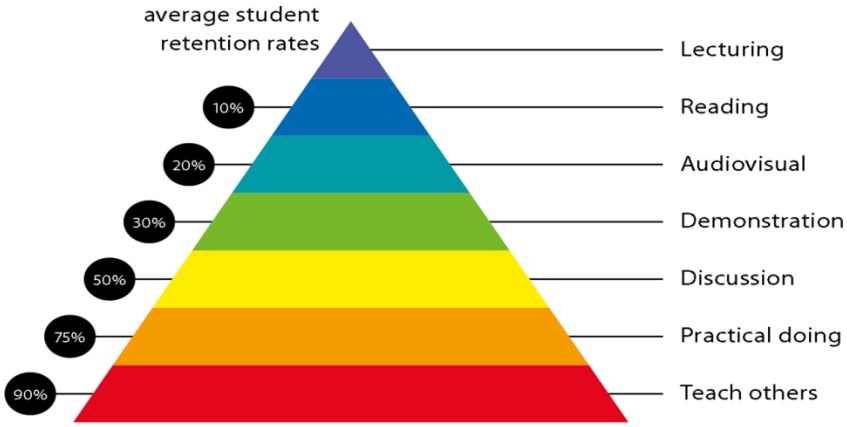


Figure 2: Knowledge retention

## Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

| General Graduate Qualities | Department of Chemistry Post Graduate Capabilities |
|---|---|
| **Informed**<br>Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas. | **1 Professional knowledge, grounding & awareness:-**<br>Student's will gain knowledge about chemistry subject in the both areas i.e. theory as well as practical's. Professionally students will know how chemistry is important in our daily life as well as to build up any industry. Students will be having knowledge/ awareness about chemicals' such as how to use them and how hazardous they are for the environment. |
| **Independent learners**<br>Engage with new ideas and ways of thinking and critically analyse issues. Seek to extend knowledge through ongoing research, enquiry and reflection. | **2 Information literacy, gathering & processing:-**<br>Student's will be able identify the problems happening in the society as well as in the industry such as Photochemistry, uses of |

| | |
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| Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others. | Aromatic heterocyclic compounds and their reactions, Organic waste coming from the industries etc. with this basic information they will be having ability to gather the possible solutions. |
| **Problem solvers**<br>Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards. | **4 Problem solving skills:**<br>Organic Chemistry education provides students with the tools to solve many problems based on Chemistry. This means that students should be able to apply the scientific method: define a problem clearly, develop testable hypotheses, design and execute experiments, analyse data using appropriate statistical methods, and draw appropriate conclusions.<br>Students should be able to integrate knowledge across chemical sub disciplines and apply this knowledge to solve problems. In the laboratory, in addition to the characteristics described above, students should understand the fundamental uncertainties in experimental measurements. |
| **Effective communicators**<br>Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication. | **5 Written communication:-**<br>Students should be able to retrieve specific information from the chemical literature, critically evaluate technical articles, and manage many types of chemical information. Students should able to develop proficiency with electronic searching of appropriate technical databases, including structure-based searching. |
| | **6 Oral communication:-**<br>Students should orally able to use communication technology such as computerized presentations as well as software for word processing, chemical-structure drawing, writing review article on any related topic, poster preparation and research paper presentation to any conferences. |
| | **7 Teamwork:-**<br>Students should be able to Solve scientific problems often involves working in disciplinary and multidisciplinary teams. This is especially true in industry and increasingly in academic settings. Students should learn to work productively with a diverse group of peers in classroom and |

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|---|---|
| | laboratory activities. Students should be able to lead portions of an activity or be effective followers, as dictated by the situation. Peer- and self-assessment is often an effective way to evaluate student contributions to group activities. |
| **Responsible**<br>Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities. | **10 Sustainability, societal & environmental impact:**<br>With this course students will know/ aware/ learn about the sustainable use of the organic reagents while performing the laboratory experiments. Students will be able to understand various photochemical reactions happening in the environment and their participation in global warming. So they will be having capabilities/ knowledge how to tackled/ deal with different types of organic pollutants coming from the organic laboratory and industry. |

## Practical work: NA

(Mention what practical work this Course involves)

## Lecture/tutorial times

(Give lecture times in the format below)

| |
|---|
| |

## Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

## Details of referencing system to be used in written work

1. Foye's Principles of Medicinal Chemistry, 5th edition, David A. Williams, Thomas L. Lemke, Lippincott Williams & Wilkins publisher - a Walter kluwer business, ISBN – 13: 978-81-89836-02-3 ISBN – 10: 81-89836-02-1. ISBN: 0-7817-4211-0.
2. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 11th edition, John H. Block, John M. Beale, Jr., Lippincott Williams & Wilkins publisher - a Walter Kluwer business, ISBN – 0-7817-3481-9

3. Principles of Medicinal Chemistry, Volume – I & II, 15th edition, Dr. S. S. Kadam, Dr. K. R. Mahadik, Dr. K. G. Bothara, Nirali Prakashan, ISBN: 81-85790-04-3.
4. Medicinal Chemistry, Ashutoshkar (author), New age international publisher, ISBN – 81-224-1970-4.
5. Text book of Medicinal Chemistry, S. Alagarsamy (Author), Vol – I/II, Elsevier, Rajkamal Electric Press, Kundli, Haryana, ISBN – 978 – 81- 312 – 2189 – 1.
6. Burger's Medicinal Chemistry, Drug Discovery and Development, Volume 1 to 6, Editiors: Donald J. Abraham, David P. Rotella, Wiley-Interscience, ISBN-10: 0471370282, ISBN-13: 978-0471370284.

## Text books

1. An Introduction to Medicinal Chemistry, Fifth Edition- Graham L. Patrick, Oxford University Press.
2. Modern Methods of Organic Synthesis: W. Carruthers (Cambridge).
3. Organic Reaction Mechanism: V. K. Ahluwalia and R. K. Parashar ( Narosa).
4. Organic Chemistry: Clayden, Greeves and Warren (Oxford).
5. Peter Sykes, Longman: A Guide Book to Mechanism in Organic Chemistry.
6. H.O. House, W.A. Benjamin: Modern Synthetic Reactions.

## Additional Materials: NA

## ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

- **Theory**
- CIE (60 marks)
  1. Mid semester Examination = 40 marks
  2. Attendance = 5 marks
  3. Presentation = 5 marks
  4. Assignment = 10 marks

  **Total = 60 marks**

- ESE (40 marks)
  1. Theory Exam = **40 marks**

## SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e. mid semester or end semester) of semester concerned. Students must make themselves

available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

### Practical Work Report/ Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

### Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

### Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

### Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

### University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

**Plagiarism** - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

***Do not copy the work of other students.***
***Do not share your work with other students (except where required for a group activity or assessment)***

## Course schedule (subject to change)

**(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)**

| | Week # | Topic & contents | CO Addressed | Teaching Learning Activity (TLA) |
|---|---|---|---|---|
| | Weeks 1 | **Unit-I**<br>**Basic principles of drug chemistry:** Structure of biological membrane, physicochemical parameters affecting drug action, | 1 & 6 | |
| | Weeks 2 | drug absorption, distribution and elimination. Stereo chemical aspects of drug action, drug receptor interaction including transduction mechanism, blood brain barrier. | 1 & 6 | |
| | Week 3 | **Rational design of enzyme inhibitors:** Enzyme kinetics and principles of enzyme inhibitors, enzyme inhibitors in drug, rational design of non-covalently | 1 & 6 | |
| | Week 4 | and covalently binding enzyme inhibitors. Introduction to artificial enzymes, design and therapeutic applications of peptidomimetics. | 1 & 6 | |
| | Week 5 | **Unit-II**<br>**Pharmacokinetics:** A brief introduction to drug absorption, distribution, metabolism and elimination, pharmacokinetics parameters | 2 & 5 | |
| | Week 6 | such as bioavailability, area under the curve, volume of distribution clearance, concept of pro drugs, hard and soft drugs. | 2 & 5 | |
| | Week 7 | **Pharmacodynamics:** Drug Targets: Enzymes, receptors and nucleic acids, | 2 & 5 | |
| | Week 8 | principles of enzyme inhibitors and stimulators, drug receptors action and associated theories. | 2 & 5 | |
| | Week 9 | **Unit-III**<br>**Drug Discovery:** Introduction, irrational approach, rational approach, antisense approach, finding a lead Drug Design–optimizing target interaction, | 3 & 4 | Mid Semester Exam |
| | Week 10 | binding role of various functional groups, identify the pharmacophores, Strategies in drug design, amide, sulfur, and halogen compounds. | 3 & 4 | |

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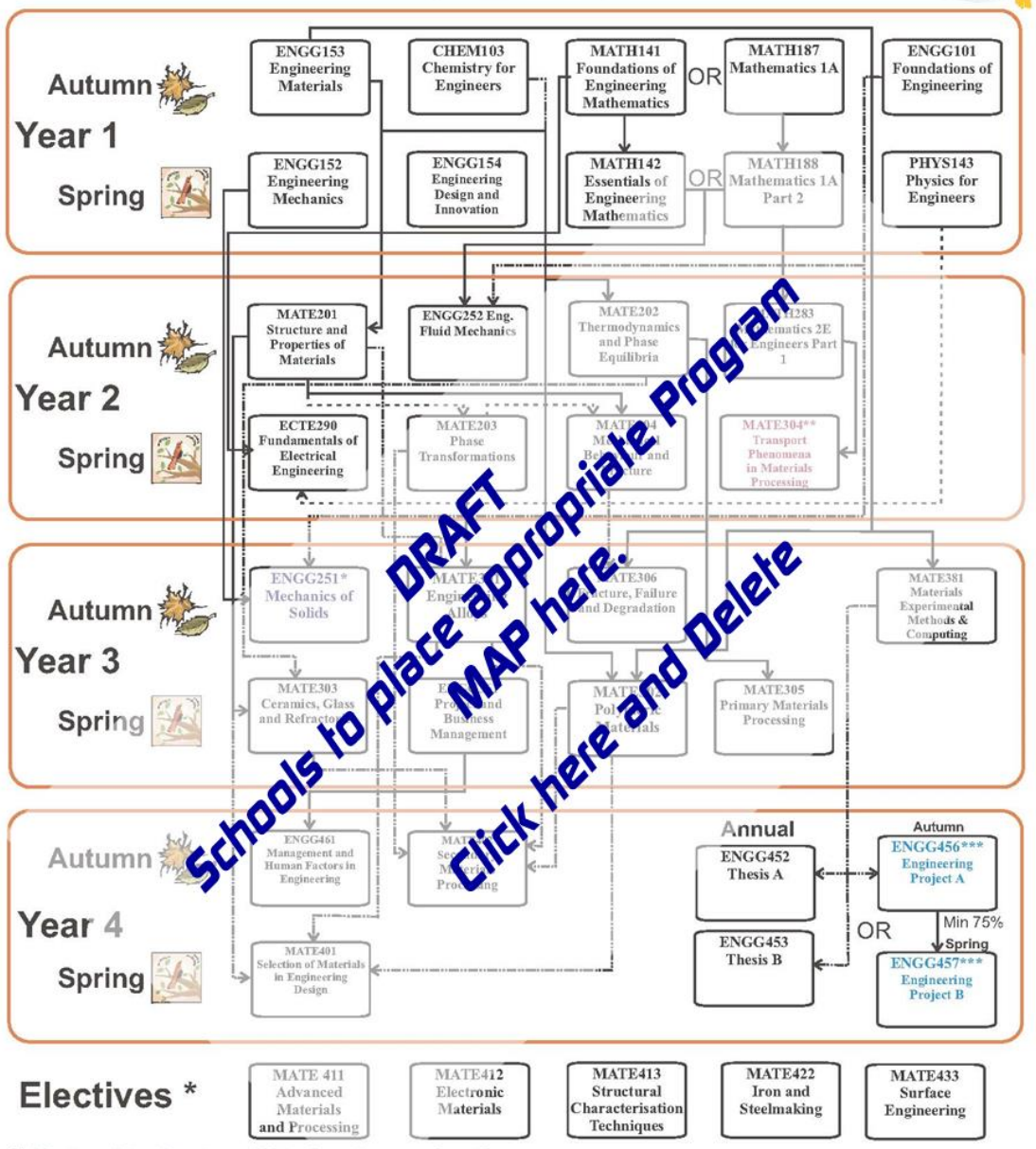
|---|---|---|---|---|
| | | | | |
| | Week 11 | computer aided drug design (in brief), drug design–optimizing access to the target Improve absorption, making drugs more resistant to chemical and | 3 & 4 | |
| | Week 12 | enzymatic degradation, making drugs less resistant to drug metabolism, targeting drugs, reducing toxicity, prodrug, endogenous compounds as a drug. | 3 & 4 | |
| | Week 13 | **Unit-IV**<br>**Protein as–drug:** Protein–drug interaction (viz. intramolecular bonding forces), Drug action at protein, Peptide or protein as drugs. | 4 & 6 | |
| | Week 14 | **Enzymes as–drug target:** Enzymes as catalyst, the active sites of an enzyme, | 4 & 6 | |
| | Week 15 | Substrate binding at active sites, Enzymes inhibitors: Mechanism based enzyme in activators, examples. | 4 & 6 | |
| | Week 16 | **Receptor as–drug target:** Introduction to receptor & Receptors role. | 4 & 6 | |

# PROGRAM MAP for Bachelor of Engineering (Materials Engineering)

## DEGREE - 2012






* Note: Students will take three electives
Some electives are only offered every 2nd year

ENGG251* Note: Full time students entering Year 3 in 2012 will need to take one elective in Autumn as they have already completed ENGG251

MATE304** Note: Full time students entering Year 3 in 2012 will need to take MATE304 in Spring of their 4th year or take it in 2012 and defer another subject to Spring 2012

ENGG456***Note: If ENGG456 Engineering Project A (6cp) is done instead of a thesis, a student needs to complete 4 electives and is not eligible for honours