



# **JAI HIND COLLEGE**

Basantsing Institute of Science & J. T. Lalvani College of Commerce.

And Sheila Gopal Raheja College of Management

**Affiliated to University of Mumbai**

**Autonomous**

**Masters of Science (M.Sc in Organic Chemistry)**

## Semester I

<b>Course Code:</b> <b>PSCHE103</b>	<b>Course Title: Organic Chemistry I</b>
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### **Learning Objectives:**

1. To understand the concept outlining the feasibility of a reaction and its possible pathway.
2. To synthesize the desired product with the appropriate reagent.
3. To analyze the stereochemical arrangement of molecules.

### **Learning Outcomes:**

1. To design reaction pathway
2. To predict the correct stereochemical configuration of molecules.
3. To justify the formation of products based on the reaction pathway

## Semester I

<b>Course Code:</b> <b>PSCHEPR103</b>	<b>Course Title: Organic Chemistry Practical I</b>
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### **Learning Objectives:**

1. To comprehend the planning of a reaction based on stoichiometric calculations.
2. To apply the theoretical concepts in understanding the reaction conditions.
3. To understand the concept of recrystallization.

### **Learning Outcomes:**

1. To calculate based on reaction stoichiometry
2. To predict the percentage formation of a product
3. To systemise the correct solvent of recrystallisation based on the solubility of a compound

## Semester II

<b>Course Code:</b> PSCHE203	<b>Course Title: Organic Chemistry II</b>
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### **Learning Objectives:**

1. To understand the chemistry of enolates and name reactions
2. To understand the MOT of different molecules
3. To understand the principles of photochemistry and electronic excitations.

### **Learning Outcomes:**

1. To discuss new name reaction
2. To determine enol enolate chemistry along with its application.
3. To solve spectral problems merging all spectroscopic techniques together.

## Semester II

<b>Course Code:</b> PSCHEPR203	<b>Course Title: Organic Chemistry Practical II</b>
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### **Learning Objectives:**

1. To understand the separation of binary mixture using physical and chemical methods.
2. To discuss the characterization of one component.
3. To describe the purification and determination of mass and physical constant of the second component.

### **Learning Outcomes:**

1. To separate binary mixture using physical and chemical methods.
2. To characterize components
3. To determine mass and physical constant of the second component in a mixture.

### Semester III

<b>Course Code:</b> PSCHE3301	<b>Course Title: Theoretical Organic Chemistry-I</b>
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#### **Learning Objectives:**

1. To understand advanced techniques of organic reaction like photochemistry, electro organic, pericyclic.
2. To understand the reaction and mechanism of organic products.
3. To understand stereochemistry of cycloalkanes and fused ring.

#### **Learning Outcomes:**

1. To perform photochemistry eletro-organic and pericyclic reactions
2. To explain the concept of advance organic reactions
3. To predict correct stereochemical conformations of cycloalkanes and fused rings.

### Semester III

<b>Course Code:</b> PSCHE3302	<b>Course Title: Synthetic Organic Chemistry I</b>
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#### **Learning Objectives:**

1. To understand the mechanism of name reactions.
2. To illustrate the application of radicals in organic chemistry.
3. To understand the application of metal and non-metals in organic synthesis.

#### **Learning Outcomes:**

1. To explain the mechanism of novel reactions.
2. To discuss the importance of radicals in organic reactions.
3. To illustrate the application of metals and non-metals in organic synthesis.

### Semester III

<b>Course Code:</b> PSCHE3303	<b>Course Title: Natural Products &amp; Heterocyclic Chemistry</b>
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#### **Learning Objectives:**

1. To understand the structure of carbohydrates, amino acids, nucleic acid and steroids.
2. To elaborate the chemistry of natural products.
3. To understand the synthesis of heterocyclic compounds.

#### **Learning Outcomes:**

1. To draw the structure of carbohydrates, amino acids, nucleic acid and steroids.
2. To explain the chemistry of natural products.
3. To discuss the synthesis methods of heterocyclic compounds.

### Semester III

<b>Course Code:</b> PSCHE3304	<b>Course Title: Medicinal Chemistry, Biogenesis &amp; Green</b>
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#### **Learning Objectives:**

1. To understand the development and design of drug discovery.
2. To understand the synthetic method of drug.
3. To explain the concept of biosynthesis of metabolites, green chemistry

#### **Learning Outcomes:**

1. To describe the development and design in drug discovery.
2. To discuss the synthetic method of drug.
3. To summarise the concept of biosynthesis of metabolites, green chemistry.

### Semester III

<b>Course Code:</b> <b>PSCHEP3301</b>	<b>Course Title: Separation of Organic Mixture</b>
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#### **Learning Objectives:**

1. To understand the nature of the components of a binary mixture.
2. To separate the components of a binary mixture by chemical/physical method.
3. To purify the components of binary mixture by recrystallization/distillation

#### **Learning Outcomes:**

1. To identify the binary component in a reaction mixture
2. To adjudge the method of separation (physical or chemical) for a given mixture of organic compounds.
3. To ascertain the extent of separation based on weights of isolated compounds, physical constants & identification

### Semester III

<b>Course Code:</b> <b>PSCHEP3302</b>	<b>Course Title: Characterisation of Organic Compounds</b>
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#### **Learning Objectives:**

1. To determine the nature of the components of a binary mixture.
2. To learn the physical/chemical separation techniques for the components of a binary mixture
3. To purify the components of binary mixture by recrystallization/distillation

#### **Learning Outcomes:**

1. To distinguish binary components in a mixture
2. To apply the method of separation (physical or chemical) for a given mixture of organic compounds.
3. To calculate the extent of separation based on weights of isolated compounds, physical constants & identification

### Semester III

<b>Course Code:</b> <b>PSCHEP3303</b>	<b>Course Title: Research Methodology</b>
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#### **Learning Objectives:**

1. To understand a general definition of research design.
2. To familiarize with how to write a good introduction to educational research study
3. To understand the components that comprise a research such as introduction.

#### **Learning Outcomes:**

1. To identify a research problem stated in a study.
2. To distinguish a purpose statement, a research question or hypothesis,
3. To write research objectives of study.

### Semester III

<b>Course Code:</b> <b>PSCHEP3304</b>	<b>Course Title: Literature Review</b>
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#### **Learning Objectives:**

1. To understand the existing research and debates relevant to a particular topic
2. To learn the area of study
3. To understand the knowledge and to present the same in the form of a written report.

**Learning Outcomes:**

1. To identify existing research and debates on relevant topic
2. To critically determine area of study
3. To write a review and conclude its finding.



### Semester IV

<b>Course Code:</b> <b>PSCHE3401</b>	<b>Course Title: Theoretical Organic Chemistry-II</b>
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#### **Learning Objectives:**

1. To understand the effect of substituents on rate of reaction through Hammett, Yukawa-Tsuno, Taft equations.
2. To introduce the emergence of supramolecular chemistry.
3. To understand the separation of stereochemical mixtures

#### **Learning Outcomes:**

1. To describe the effect of substituents on rate of reaction through Hammett, Yukawa-Tsuno, Taft equations.
2. To describe novel supramolecular architectures.
3. To summarise Cotton effect and its applications

### Semester IV

<b>Course Code :</b> <b>PSCHEP3401</b>	<b>Course Title: Organic Syntheses</b>
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#### **Learning Objectives:**

1. To learn the principles of purification techniques.
2. To understand the methods of organic synthesis
3. To determine methods suitable for different organic synthesis

#### **Learning Outcomes:**

1. To apply appropriate techniques for organic synthesis
2. To synthesize organic compounds
3. To purify organic compounds

### Semester IV

<b>Course Code:</b> PSCHE3402	<b>Course Title: Synthetic Organic Chemistry-II</b>
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#### **Learning Objectives:**

1. To introduce the concept of Retrosynthesis.
2. To explain the generation and applications of enamines, ylides in organic synthesis.
3. To understand the mechanisms of CH activation.

#### **Learning Outcomes:**

1. To describe the concept of umpolung (Reversal of polarity).
2. To discuss the generation and applications of enamines, ylides in organic synthesis.
3. To exemplify the application of CH activation.

### Semester IV

<b>Course Code:</b> PSCHEP3402	<b>Course Title: Purification Techniques</b>
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#### **Learning Objectives:**

1. To learn the principles of different purification techniques
2. To understand the methods of organic synthesis
3. To distinguish between different purification methods.

#### **Learning Outcomes:**

1. To analyze different purification methods
2. To synthesize organic compounds using appropriate techniques
3. To purify the synthesized organic compounds

### Semester IV

<b>Course Code:</b> <b>PSCHE3403</b>	<b>Course Title: Photochemistry and Advanced Spectroscopy</b>
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#### **Learning Objectives:**

1. To introduce the concept of Photochemistry & Photocatalysis.
2. To understand the principal and application of fluorescence phenomena.
3. To describe the principal, instrumentation and applications of advanced Spectroscopic Techniques-I& II.

#### **Learning Outcomes:**

1. To apply the principles of Photochemistry & Photocatalysis in water splitting, CO<sub>2</sub> reductions etc.
2. To describe the phenomena and mechanism of fluorescence quenching.
3. To elucidate the structure of molecules applying advanced Spectroscopic Techniques-I & II.

### Semester IV

<b>Course Code:</b> <b>PSCHEP3403</b>	<b>Course Title: Spectral Interpretation</b>
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#### **Learning Objectives:**

- 1.To understand spectral data of molecules
- 2.To elucidate structural information about molecules from their spectral data.
3. To understand the principles of UV/IR/NMR/Mass/XRD

#### **Learning Outcomes:**

- 1.To handle instruments such as UV/IR
- 2.To interpret UV/IR/NMR/Mass/XRD spectra
3. To determine structure of molecules based on spectral data

### Semester IV

<b>Course Code:</b> <b>PSCHE3404</b>	<b>Course Title: Materials, Devices and Computational Chemistry</b>
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#### **Learning Objectives:**

1. To describe different photovoltaic cells and its applications in batteries and supercapacitors.
2. To introduce the concept of organic semiconductors, optoelectronic devices.
3. To introduce the Intellectual Property Rights & Cheminformatics.

#### **Learning Outcomes:**

1. To identify different types of photovoltaic cells and its applications in batteries and supercapacitors.
2. To explain the working of organic semiconductors, optoelectronic devices.
3. To describe Intellectual Property Rights & Cheminformatics.

### Semester IV

<b>Course Code:</b> <b>PSCHEP3404</b>	<b>Course Title: Research Project</b>
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#### **Learning Objectives:**

1. To learn the design of a research problem
2. To understand experimental investigation
3. To make a written project report.

#### **Learning Outcomes:**

1. To design appropriate research workflow- literature review, identification of research problem
2. To investigate the research problem experimentally
3. To write a project report