

S-VYASA Deemed to be University

School of Advanced Studies

(Under section 3 of the UGC act, 1956)

Sattva Global City, Bengaluru-560059



REGULATIONS (AMENDED) GOVERNING THE DEGREE OF

DOCTOR OF PHILOSOPHY IN APPLIED SCIENCES

(With effect from January 2025 onwards)

MESSAGE FROM HONORABLE CHANCELLOR

Dr. H R Nagendra

Chancellor

S-VYASA (Deemed to be University),
Bengaluru.



Dr. H R Nagendra

The education system in India has a very long history, which speaks of the system of education existed and its role in building the society. The ancient system of education that prevailed over most part of the nation has laid the foundation to place the country as leader in imparting education. Though the modern education System which prevailed over few centuries back tried to mask the traditional system of education prevailed in India, it may be noticed that gradually most of the countries across globe are adopting the traditional (Gurukula) system of education, on understanding the fact that the traditional system of education molds the Individual to face any challenges in the life.

S-VYASA aims to provide high-quality professional education in Yoga, combining the best of the east and the best of the west. The Ph.D. program provides a unique opportunity for all the scholars to unravel the ancient lore and fathom the new Dimensions using empirical methodologies.

I take opportunity to express my heartfelt thanks and also congratulate Dr. B R Ramakrishna, Vice-Chancellor, Dr. N K Manjumnath, Pro-Vice Chancellor, Prof. M K Sridhar, Registrar, Dr. Sony Kumari, Dean of Academics in taking this task forward.

I wish the Ph.D scholars an enlightening experience which would earmark a journey towards academic excellence.

With Love,

Dr. H R Nagendra

MESSAGE FROM HONORABLE VICE-CHANCELLOR

Dr. Manjunath NK

Vice-Chancellor,

S-VYASA Deemed to be University,

Bengaluru



Vice Chancellor

The Doctor of Philosophy (Ph.D.) is a research-oriented program for those who have the nature of seeking greater depths of knowledge. Swami Vivekananda Yoga Anusandhana Samsthana aims to provide high-quality professional education in Yoga, combining the best of the east (ancient wisdom) and the best of the west (scientific research). The Ph.D. program provides a unique opportunity for all the scholars to unravel the ancient lore and fathom the new dimensions using empirical methodologies. As the world is looking beyond the scope of modern medicine, students pursuing their academia and research in Yoga and integrative medicine shall guide the society towards holistic health and wellbeing,

According to our ancient education system, Guru-Sishya (गुरु-शिष्य) parampara has a significant role in indoctrinating the student and freedom to question. Reviving this legacy in our Ph.D. program, we are making sure that the guide and the student have a chance to strive for the most exhilarating and memorable experience in their research journey. Ph.D. is not a degree for commemoration. It is the first step of “Anvesana,” seeking higher dimensions of learning.

The Ph.D. program manual contains a wealth of information that will help doctoral scholars to understand the policies and procedures governing course work, various timelines, monitoring semester-wise progress, the structure of pre-synopsis, thesis and executive synopsis, and guidance for publications in the context of completing research work. This manual will act as a ready reckoner for all doctoral scholars by providing answers to the most frequently asked questions. I wish the scholars a great learning experience.

With best regards,

Dr. Manjunath NK

Ph.D. Regulations 2024

(Regulations for the academic year 2024-25 onwards)

Preamble

To incorporate the guidelines issued by UGC vide Notification dated 5th May 2016, No.F.1-2/2009(EC/PS)V(I) Vol(II), the following amendments have been made in the regulation for Ph.D. Course of School of Advanced Studies, S-VYASA (Deemed to be University). Hence this amended regulation for the Ph.D. Course.

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1. Short title, Application and Commencement.

These regulations shall be called ‘Ph.D. Regulations 2024. These regulations shall come into force from August 2024 with acceptance of the Board of Management.

2. Definitions

In these Regulations unless the context requires otherwise or it is specifically so defined:

- a. GOI means ‘Government of India’ in abbreviated form.
- b. GOK means ‘Government of Karnataka’ in abbreviated form.
- c. UGC means ‘University Grants Commission’ established at New Delhi by an Act of Parliament in 1956.
- d. S-VYASA (Deemed to be University) means ‘Swami Vivekananda Yoga Anusandhana Samsthana’, with its headquarters at Bangalore, Karnataka.
- e. S-VYASA-RET mean S-VYASA Research Entrance Test conducted by the University for preparing the merit list of candidates for admission to the Ph.D. course.
- f. Admission Committee means ‘a committee constituted by the University to carry out the activities concerning the admission of candidates to the Ph.D. Course’.
- g. Course work means ‘the programs prescribed as a part of the Ph.D. Course, which all the candidates shall successfully complete as a pre-requisite’.
- h. Research work means ‘the research work/project carried out by the candidate during his Ph.D course.
- i. Research Supervisor means ‘a qualified faculty member / scientist recognized by the University to supervise/ guide the Ph.D. candidates’.
- j. Co-Research Supervisor means ‘the additional Research Supervisor who supervises/guides the doctoral research of a candidate along with the Research Supervisor’.
- k. Research Advisory Committee (RAC) means ‘the Committee constituted by the University to review the research progress of a research scholar’.
- l. Viva Voce Board means ‘a Committee of experts appointed by the University to conduct the final viva-voce on

the Thesis submitted by the candidate’.

3. Duration of the Ph.D. Course:

3.1 Ph.D. Course, Full Time shall be for a minimum duration of three years including course work and a maximum of six years. Part- Time shall be for a minimum duration of Four years including course work and a maximum of seven years.

3.2 Under special circumstances, provision for extension beyond the above limits, subject to a maximum of one year, shall be granted on the recommendation of the High-Power Committee and approved by the Vice Chancellor.

3.3 The women candidates and Persons with Disability (more than 40% disability) may be allowed a relaxation of two years for Ph.D. in the maximum duration, including Maternity Leave/Child Care Leave once in the entire duration of Ph.D. course.

4. List of Divisions:

The University shall permit the registration for Ph.D. under Applied Sciences category in the following Divisions, namely,

1. PhD in Chemistry.
2. PhD in Mathematics.

A candidate is allowed to pursue Ph.D. program in a subject area of inter-disciplinary nature subject to the approval from Research Advisory Committee (RAC).

5. Eligibility criteria for admission to Ph.D. Course.

The eligibility requirement for candidates to get admitted to the Ph.D. Course shall include the following:

5.1 General eligibility requirements for Part-time/Full-time Ph.D. Course.

The general eligibility requirement for candidates to get admitted to the Ph.D. Course shall include the following:

 Master degree in the field of Applied Science such as Chemistry and Mathematics from a recognized University with 55% aggregate marks.

Full-Time Ph.D. Course

- ☞ The minimum qualification is as per 5.1.
- ☞ During course-work, classes will be conducted on all the working days of S-VYASA Deemed to be university, at Bangalore. Minimum attendance of 90% is to be followed in every subject.

5.1.1 Part-Time Ph.D. Course

- ☞ The minimum qualification is as per 5.1.
- ☞ During course-work, Classes will be conducted on Saturdays and Sundays at S-VYASA. Minimum attendance of 90% is to be followed in every subject.
- ☞ Part time Ph.D. will be allowed provided all the conditions mentioned in the extant Ph.D. Regulations are met.
- ☞ All the part time Ph.D. candidates have to produce No Objection Certificate (NOC) from their parent organization before getting admitted to the course.

5.2 Relaxation of Marks for special categories.

A relaxation of 5% of marks, from 55% to 50%, or an equivalent relaxation of grade, may be allowed for those belonging to SC/ST/OBC (non-creamy layer)/Differently - Abled and other categories of candidates as per the decision of the Commission from time to time, or for those who had obtained their Master's degree prior to 19th September, 1991. The eligibility marks of 55% (or an equivalent grade in a point scale wherever grading system is followed) and the relaxation of 5% to the categories mentioned above are permissible based only on the qualifying marks without including the grace mark procedures.

6. Admission Procedure

6.1 Entrance Test

- Selection of candidates for Ph.D. Course will be based on qualifying in the national level entrance test Conducted by S-VYASA (Deemed to be University).
- A candidate shall be declared to have passed the entrance test when he/ she scores at least 50% of the marks in the entrance test.

6.2 Interview

- Candidates who have passed the entrance test shall appear for an interview conducted by the Admission Committee where the candidate will be assessed for depth of knowledge, research potential and personality.
- The Research Supervisors having vacancy of research students under them will select the candidates depending on their field of research work.
- The selected student list will be announced along with the guide names after the interview by the Admissions Committee and Division wise selected list will be announced and communicated to the candidates.
- Those who have passed JRF/NET (National Eligibility Test)/SLET/KSET/GATE are exempted from the entrance test, but have to appear for interview with a brief synopsis of their intended research topic.
- The validity of the pass in entrance examination for Ph.D. course is valid for one academic year only, after which the candidate has to undergo the process of admission again.

7. Recognition and Allocation of Research Supervisor

1. Any regular Professor of S-VYASA, Deemed to be University with a Ph.D. degree and at least five research publications in refereed journals and any regular Associate/Assistant Professor of S-VYASA, Deemed to be University with a Ph.D. degree and at least two research publications in refereed journals after his/her Ph.D. may be recognized as Research Supervisor.
2. Provided that in areas/disciplines where there is no or only a limited number of refereed journals, the Research Advisory Committee of the University may relax the above condition for recognition of a person as Research Supervisor with reasons recorded in writing.
3. Co-Research Supervisor can be allowed in inter-disciplinary areas from other Divisions of the University or from other related institutions with the approval of the Research Advisory Committee. Co-Research Supervisors should have a Ph.D. with minimum 2-post doctoral publications and 2-years of experience.
4. The reallocation of Research Supervisor for a selected research scholar, in case the allotted Research Supervisor leaves the university or any other emergencies shall be decided by the division concerned depending on the number of vacancy of scholars per Research Supervisor, the available specialization among the Research Supervisors and research interests of the scholars as indicated by them at the time of interview.
5. In case of topics which are of inter-disciplinary nature where the Division concerned feels that the expertise in

the Division/Department has to be supplemented from outside, the Division may appoint a Research Supervisor from the Division itself, who shall be known as the Research Supervisor, and a Co-Supervisor from outside the Division/ University on such terms and conditions as may be specified and agreed upon by the consenting Institutions/Colleges.

6. A Research Supervisor/Co-supervisor who is a Professor, at any given point of time, cannot guide more than Eight (8) Ph.D. scholars. An Associate Professor as Research Supervisor can guide up to a maximum of Six (6) Ph.D. scholars and an Assistant Professor as Research Supervisor can guide up to a maximum of four (4) Ph.D. scholars, including reservation category.
7. A candidate cannot change his/her Research Supervisor /Co-Research Supervisor during his/her complete Ph.D. course except in case of emergency, approved by RAC.

8. Ph.D. Research Course details

Ph.D. Course consists of the following Steps:

1. Course work.
2. Presenting 4 closely relevant base papers before the Research Committee
3. Getting approval of Comprehensive Project Evaluation Board.
4. Submission and presentation of Pre-Synopsis to the RAC.
5. Getting the clearance from relevant regulatory bodies and committees for the Experimental work if applicable.
6. Starting of Experimental work.
7. Semester progress reports presentation (every 6 months) in front of RAC.
8. Presenting minimum 2-research papers in International Conferences.
9. Writing of Research papers and submits to the journals.
10. Publication / Acceptance of
 - Minimum 3-research papers in UGC-CARE approved list of journals or standard indexing databases like Web of Science, SCI, Scopus.
 - Presentation and submission of Executive Synopsis.

Plagiarism Check. (The Research Supervisor should submit the soft copy of the thesis to plagiarismcheck@svyasa).

edu.in). The results of plagiarism check should satisfy the UGC norms as mentioned in the UGC website.

Thesis submission and adjudication by Reviewers (National and International) with favorable report by all reviewers.

Formation of Viva-Voce Committee.

Final defense of the thesis by the candidate (Final Viva-Voce) and award of degree.

Submission of copies of Four hard bound and Electronic copies of the thesis incorporating all the corrections recommended by the Committee.

Provisional Certificate to be issued after submission of all the necessary documents.

Issue of the Ph.D. Degree Certificate on Convocation day (January 12th of each year).

Note: The above points are mostly relevant for students undertaking empirical studies, however for those students undertaking theoretical studies the process may slightly vary, which will be discussed on case-by-case basis.

	Ph.D. Admission		
	 Submission of Tentative Synopsis		
	 Selection of student by Guide		
	 Formation of RAC Committee		
		<i>Journal presentations / Conference</i>	<i>Semester Report Presentations @</i>
	Course Work		
	Research Topic Approval by CPEB		
	Research Topic Approval by RAC (Pre-Synopsis presentation)		
	Clearance from relevant committees		
	Data Collection		
	Executive Synopsis Presentation		
	Submission of Thesis for Review		
	Final Defense Presentation and award of Ph.D. degree.		
	Submit the hard bound copies and soft copy of Thesis		
	Issue of the Ph.D. degree Certificate on Convocation Day.		

Ph.D. Process

8.1 Course-Work:

1. The coursework shall be treated as prerequisite for preparing the Scholars for Ph.D. Degree.
2. The students are suggested to complete the Ph.D. coursework within 1-year from the date of registration for full time students. For part-time students, the maximum duration shall be 1.5 years.
3. The Ph.D. Course work shall comprise of one mandatory subject as prescribed by UGC, on “Research Methodology”, one on the subject “Introduction to Yoga Philosophy” and other two subjects can be chosen based on the student’s area of specialisation duly approved by the Research Advisory Committee.
4. The Division where the scholar pursues his/her research shall prescribe the subject(s) to him/her based on the recommendations of the Research Advisory Committee.
5. Grades in the course work, including Research Methodology and Introduction to Yoga Philosophy subjects shall be finalized after a combined assessment by the Research Advisory Committee and the Division and the final grades shall be communicated to the candidate.
6. A Ph.D. scholar has to obtain a minimum of 50% of marks Course work in order to be eligible to continue Ph.D. course and submit the dissertation/thesis. Note that every subject should be passed within two attempts, otherwise his/her admission to Ph.D. course stands cancelled.
7. Candidates failing to fulfil the above requirements are liable to get their registration automatically cancelled and no further extension will be permissible for completing the course work. Such candidates are free to apply for re-admission into Ph.D.

8.2 Semester Progress Reports:

1. A research scholar shall appear before the Research Advisory Committee once in six months (every semester) to make a presentation of the progress of his/her work for evaluation and further guidance. The semester progress reports shall be submitted by the Research Advisory Committee to the Ph.D. Department with a copy to the research supervisor.
2. In case the progress of the research scholar is unsatisfactory, the Research Advisory Committee shall record the reasons for the same and suggest corrective measures. If the research scholar fails to implement these corrective

measures, the Research Advisory Committee may recommend to the University, with specific reasons, for cancellation of the registration of the research scholar.

3. If the Ph.D. research scholar fails to submit the two consecutive progress reports or abstains from presentation of progress report, the RAC may recommend for cancellation of the registration of the research scholar.
4. If the research scholar fails to complete the entire Ph.D. work including the submission of thesis within the stipulated period, the registration of the research scholar shall be cancelled as per the university regulations.

8.3 Journal presentations:

1. It is mandatory to present 4 published research papers related to their topic of research in the Journal for the completion of the Ph.D. course. Students are suggested to present at least two research papers before their Pre-synopsis presentation before the research committee.
2. The presentation will be conducted division wise, under the presence of Research Supervisors, Deans and other Ph.D. scholars and faculties. The presentation schedule will be communicated by the Division In charge for JC presentation, at the beginning of each semester.
3. Scholars should select only the published papers from high impact factor journals or the best journal related to their area of research.
4. Research scholars who are involved in theoretical research can present critical review of Books /Articles related to their topic of research.
5. The selected papers / books should be approved by the Research Supervisor before presentation.

8.4 Pre-Synopsis Presentation:

1. Ph.D. scholar should complete his/her Course-work and is also suggested to complete 2-JC presentations before Pre-Synopsis presentation.

The Research Supervisor shall submit the Pre-synopsis document of Student's Research Proposal to the Comprehensive Project Evaluation Board (CPEB) for approval through e-mail: cpeb@svyasa.edu.in

☞ Research Proposals submitted until 10th of every month will be evaluated by Sub-committees.

☞ The Final report of CPEB along with recommendations on technical and ethical aspects will be shared with the member secretary of IEC and the respective Research Supervisors.

☞ The Research proposal, incorporating the changes as recommended, shall be approved by CPEB.

2. After CPEB approval, research supervisor shall request Ph.D. office in the prescribed format for Pre-Synopsis presentation in the presence of Research Advisory Committee, by submitting the below documents
 - a. CPEB approval.
 - b. One hard copy of Pre-Synopsis with spiral binding (duly signed by Research Supervisor)
 - c. Soft-copy of the Pre-Synopsis document.
 - d. Soft-copy of the Power Point Presentation of Pre-Synopsis.
 - e. Soft-copy of the CV with a color photo of the External Expert.
 - f. Ph.D. office will take minimum 15 working days for further processing.
3. The duration of presentation will be 20 minutes, followed by 10-minutes Questions/Answers and discussion. First interaction is by the external expert and then by others.
4. Any suggestions / remarks by the Research Advisory Committee have to be incorporated into the Pre-Synopsis document. The revised soft-copy of the Pre-Synopsis document should be submitted by the Research Supervisor to the Ph.D. office, after getting the approval of the external expert. Ph.D. office will then provide the RAC clearance certificate. Then, Ph.D. scholars shall proceed for IEC approval.

8.5 Approval from respective committees and Data Collection:

1. Following the approval of Pre-Synopsis, the candidate shall present the required design and plan of action to Research committee (RC), City Campus for approval.
2. The Research committee meeting will be tentatively conducted once in 3 months.
3. Candidate must follow the template provided by the Research Committee.
4. The presentation date will be fixed by the Research Committee and the same will be conveyed to the students.
5. Further, comments will have to be provided by the students for the clarifications sought by the RC (if any) during presentation.
6. Further to approval of the clarifications provided by the student to the RC, clearance certificate will be issued to the student.

8.2 Presentation in Conferences / Seminars:

Every Ph.D. scholar should make minimum **two research paper presentations** in International conferences, and produce the evidence for the same in the form of presentation certificates and/or reprints.

8.3 Paper-Publications:

Every Ph.D. scholar should publish research papers in the refereed journals and produce evidence for the same. It's necessary to publish / acceptance of -

- Minimum 3-research papers in UGC-CARE approved list of journals or standard indexing databases like Web of Science, SCI, Scopus.

8.4 Executive-Synopsis Presentation:

A Ph.D. scholar should fulfill the below requirements before the Executive Synopsis Presentation:

- a. Presentations before Research Committee
- b. Conference/ seminar presentations
- c. Publication / Acceptance of Research papers

The research Scholar shall inform Ph.D. office for Executive-Synopsis presentation in the presence of Research Advisory Committee, by submitting the below documents as per the format.

1. One hard copy of Executive-Synopsis with spiral binding (duly signed by the Research Supervisor) in the prescribed format.
2. Soft-copy of the Executive-Synopsis document.
3. Soft-copy of the Power Point Presentation of Executive-Synopsis.

The duration of presentation will be 30 minutes, followed by 20-minutes Questions/Answers and discussion by the external examiner. 10 minutes Questions/Answers by others.

The same External Examiner who evaluated the pre-synopsis shall evaluate the Executive Synopsis. In case of long absence or retirement of the External Examiner, or for any other valid reasons, the Supervisor can request the Dean of Academics for a replacement.

Any suggestions / remarks by the Research Advisory Committee have to be incorporated into the Executive-Synopsis document. The revised soft-copy of the Executive-Synopsis document should be submitted by the Research Supervisor to the Ph.D. office. Then, Ph.D. scholars shall proceed for submission of Thesis.

After Executive-Synopsis presentation,

- ☛ RAC makes a panel of national and international reviewers (minimum 3 and maximum 5) for thesis review.
- ☛ Research supervisors shall submit the reviewers list along with their biodata to Ph.D. office.
- ☛ Eligibility criteria for National and International reviewers: with Ph.D. degree/MD and at least five research publications in refereed journals and any regular Associate/Assistant Professor in any recognised University.

8.5 Thesis Submission and Evaluation by the External reviewers:

1. Following the approval of Executive-Synopsis, Ph.D. scholar should submit the following documents to Ph.D. office.
 - ☛ Thesis in the prescribed format (two spiral binding copies)
 - ☛ Thesis submission Proforma
 - ☛ List of National and International Reviewers along with their biodata
 - ☛ Plagiarism clearance certificate
2. Ph.D. Department will forward the same to the Examination Department for further processing.
3. Two external reviewers, One national & One international from the panel suggested by RAC, are selected by the Vice - Chancellor for the thesis evaluation.
4. It takes a minimum period of 30 working days to maximum period of 90 working days for the evaluation of thesis. After this period, the reviewers are asked to submit their comments and an evaluative report of the thesis to Controller of Examinations and this in turn is communicated to the candidate and the supervisors.
5. The candidate is asked to write the responses of each comment and the same needs to be executed in the thesis. All the responses written by the candidate is communicated to the reviewers.

Guidelines for Plagiarism Check:

Research supervisor should send the electronic-copy of the thesis (MS-Word Document) for Plagiarism checking to plagiarismcheck@svyasa.edu.in. and get a report.

The plagiarism check results should satisfy the 10% limits suggested by the UGC.

8.6 Open Defense (viva-voce) and award of Ph.D. degree:

1. The public viva-voce of the Ph.D.-scholar to defend the thesis shall be conducted only if the evaluation reports of the external examiners (both National and International) on the thesis are satisfactory and include a specific recommendation for conducting the viva-voce examination.
2. If one of the evaluation reports of the external examiner, is unsatisfactory and does not recommend viva-voce, the Institution shall send the dissertation/ thesis to another external examiner out of the RAC approved panel of examiners and the viva-voce examination shall be held only if the report of the latest examiner is satisfactory. If the report of the latest examiner is also unsatisfactory, the thesis shall be rejected and the research scholar shall be declared ineligible for the award of the degree.
3. Following the approval by the External reviewers, the Examination Department notifies an open defense for the candidate by inviting one of the reviewers and the Viva-Voce Committee and it becomes open for all the researchers and teaching staff of the University.
4. Following the Open Defense and two favorable opinions by the Experts (both Internal and external) the candidate is called and communicated regarding his/her viva-voce results. On the recommendation of the doctoral committee, the award of the Ph.D. degree will be announced by VC/Pro-VC /Registrar /Registrar(Evaluation) at the end of final Viva-Voce.

After the successful Open Defense,

1. The Ph.D. scholar has to submit the following to the Ph.D. Office/Examination section.
 - a. Three Hard-bound copies with both-sides printing and
 - b. The Digital Form of his/her thesis, that includes :
 - i. PPT of the final presentation.
 - ii. Final thesis in the PDF format.
 - iii. All the published papers.
2. Both the Hardbound copy and Digital media will be forwarded by the Ph.D. office to the Library.
3. Electronic copy of the Ph.D. thesis will be uploaded by the Library In charge to the INFLIBNET/Shodganga, for hosting the same so as to make it accessible to all Institutions/Colleges.
4. Convocation requisitions should also be submitted to the Ph.D. office:

- a. Convocation Application form (filled in).
- b. PPT which contains the brief Bio data of the candidate
(Photo- background should be plain, preferably white).
- c. Publication details.
- d. Abstract of the Thesis.

8.7 Provisional Degree & Convocation:

- After the successful completion of Open Defense, a formal notification will be issued, approved by the Vice – Chancellor and a provisional certificate will be issued to the candidate on application for the same.
- The Ph.D. Degree Certificate is issued to the candidate on the day of the Convocation, January 12th, which is supposed to be the S-VYASA Convocation Day of every year.

9 Boards and Committees

The University shall constitute the following Boards and Committees for monitoring the Ph.D. Programme:

1. High Power Committee
2. Admission Committee
3. Equivalence Committee
4. Comprehensive Project Evaluation Board (CPEB)
5. Research Advisory Committee (RAC)
6. Institutional Ethical Committee (IEC)
7. Viva Voce Board and
8. Such other Boards/Committees, as may be required.

The composition, duties and responsibilities of the Boards and Committees are as given below:

9.1 High - Power Committee

The High-Power Committee shall be constituted by the Vice-Chancellor.

1. Vice Chancellor: Chairperson

-
2. Director, Academics: Convener
 3. Director, Research and Development
 4. Dean, Engineering and Technology
 5. HOD, Commerce and Management
 6. Dean, Allied Sciences
 7. External Expert I- Member
 8. External Expert I- Member
 9. Registrar- Member Secretary

The scope of the Committee shall be,

- a. To lay down the policy concerning Ph.D. regulations from time to time.
- b. To resolve any issues raised by the Admission Committee or issues referred by the Registrar, S-VYASA, Bangalore.
- c. Any other related matter.
- d. The tenure of the External Member shall be 3 years. The Committee may meet as often as required, subject to a minimum of two meetings in an academic year.

9.2 Admission Committee

The Admission Committee to be constituted by the Vice Chancellor shall consist of:

1. Dean, Academics - Chairperson
2. One Dean from any Division on rotation to be nominated by VC
3. Nominee of the Academic Council – Member
4. External Expert- 1
5. Officer in-charge of Admissions

6. Registrar - Member Secretary

The Admission Committee shall be responsible for:

- a. Identifying the number of seats available for Ph.D. program and notifying in University Web site.
- b. Scrutinizing applications for eligibility for Ph.D. Program.
- c. To scrutinize the eligibility and appoint Research Supervisor/ Co-Supervisor.
- d. Selection of Ph.D. Candidates.
- e. Approving the number of candidates under each Research Supervisor division wise.
- f. The tenure of the Committee shall be 2 years. The Committee shall meet as often as required.

9.3 Equivalence Committee

The Equivalence Committee to be constituted by the Vice Chancellor shall consist of:

1. Dean, Academics - Chairperson
2. One Dean from any Division on rotation to be nominated by VC
3. Deputy Director, Curriculum – Member
4. External Expert- 1
5. Subject Experts
6. Registrar - Member Secretary

The Equivalence Committee shall be responsible:

- a. To verify and compare the syllabus of the other Universities from where students have completed their master degree in Engineering, Commerce, management and applied for the course waiver.
- b. To scrutinizing applications of the candidates to provide the course waiver.

9.4 Research Advisory Committee (RAC)

The Registrar shall constitute a Research Advisory Committee for each candidate immediately after the provisional registration and shall have the following composition:

- | | |
|-----------------------------|----------|
| 1. Director, Academics | Chairman |
| 2. Dean/HOD of the Division | Member |

- | | |
|---------------------------------------|----------|
| 3. Research Co-ordinator, City Campus | Member |
| 4. Co Supervisor (if any) | Member |
| 5. Research Supervisor | Convener |

All members of the Research Advisory Committee must be recognized research Supervisors. The Committee will be formed from the panel of names suggested by the Supervisor and nominated and approved by the Dean.

This Committee shall have the following responsibilities:

- a. (i) To review the research proposal and finalize the topic of research. (ii) To guide the Research Scholar to develop the study design and methodology of research and identify the course(s) that he/she may have to do. (iii) To periodically review and assist in the progress of the research work of the Research Scholar.
- b. The first meeting of the Committee shall be within six months after the provisional registration, and in this meeting, the Committee shall prescribe the subject (RAC subject) that the candidate needs to take as requirement for the completion of the course work.
- c. A Research Scholar shall appear before the Research Advisory Committee at least once in every semester to make a presentation of the progress of his/her work for evaluation and further guidance.
- d. In case the progress of the research scholar is unsatisfactory, the Research Advisory Committee shall record the reasons for the same and suggest corrective measures. If the research scholar fails to implement these corrective measures, the Research Advisory Committee may recommend to the Institution/College with specific reasons for cancellation of the registration of the research scholar.
- e. The Committee, after examining the progress made by the Candidate, shall recommend the submission of the Synopsis to the Ph.D. department and suggest one external examiner who is not in the employment of the Institution to approve the pre-synopsis. The pre-synopsis presentation shall be made by the Ph.D. scholar and evaluated by the external Expert in presence of the RAC. The candidate shall endorse changes in the research, if any proposed by the external examiner. The external expert shall become a part of the RAC from the pre-synopsis presentation and continue till the end of research work.
- f. The Committee shall approve the names of the Panel of Reviewers, suggested by the Supervisor for the evaluation of the Thesis, and this Panel will be forwarded by the Dean of the Academics to the Controller of Examinations. The Committee shall ensure that all the Reviewers are of high standing in the field of the research

of the Candidate.

NOTE: The External Expert or Reviewer should have a Ph.D. with minimum 2-post doctoral publications and expertization in the field of the research of the Candidate.

9.5 Comprehensive Project Evaluation Board (CPEB)

Comprehensive Project Evaluation Board (CPEB) is formed to evaluate the technical and ethical aspects of the projects and control the redundancy in the research and also to encourage Ph.D. scholars, to design and come up with quality projects.

The key areas of assessment by CPEB is on:

- i) Need and Rationale of the study
- ii) Design of the study (Technical aspects)
- iii) Ethical issues
- iv) Financial aspects

All research projects/proposals from all the courses must to be submitted to CPEB through proper channel.

9.6 Institutional Ethics Committee (IEC)

Institutional Ethics Committee (IEC) is the Committee formed of a group of people who examine the research protocol / proposal and state whether or not it is ethically acceptable.

The Vice Chancellor will constitute IEC and it is independent, competent and multi-disciplinary unit.

Constitution of Institutional Ethics Committee:

Sl. No.	Members of EC	Definition/description
1.	Chairperson/ Vice Chairperson (optional) Non-affiliated Qualifications A well-respected person from	- Conduct EC meetings and be accountable for independent and efficient functioning of the committee - Ensure active participation of all members

	any background with prior experience of having served/ serving in an EC	(particularly non-affiliated, non-medical/ non-technical) in all discussions and deliberations • Ratify minutes of the previous meetings • In case of anticipated absence of both Chairperson and Vice Chairperson at a planned meeting, the Chairperson should nominate a committee member as Acting Chairperson or the members present may elect an Acting Chairperson on the day of the meeting. The Acting Chairperson should be a non-affiliated person and will have all the powers of the Chairperson for that meeting. • Seek COI declaration from members and ensure quorum and fair decision making. • Handle complaints against researchers, EC members, conflict of interest issues and requests for use of EC data, etc.
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2.	Member Secretary/ Alternate Member Secretary (optional) Affiliated Qualifications - • Should be a staff member of the institution • Should have knowledge and experience in clinical research and ethics, be motivated and have good communication skills • Should be able to devote adequate time to this activity which should be protected by the institution	• Organize an effective and efficient procedure for receiving, preparing, circulating and maintaining each proposal for review • Schedule EC meetings, prepare the agenda and minutes • Organize EC documentation, communication and archiving • Ensure training of EC secretariat and EC members • Ensure SOPs are updated as and when required • Ensure adherence of EC functioning to the SOPs • Prepare for and respond to audits and inspections • Ensure completeness of documentation at the time of receipt and timely inclusion in agenda for EC review. • Assess the need for expedited review/ exemption from review or full review. • Assess the need to obtain prior scientific review, invite independent consultant, patient or community representatives. • Ensure quorum during the meeting and record discussions and decisions.
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The IEC's Member-secretary screens the research proposals for their completeness and depending on the risk involved, categorize them into 3 types:

- 1) Exemption from review for proposals that involve less than minimal risk.
- 2) Expedite review for more than minimal risk proposals, minor protocol amendments, research on disaster management.
- 3) Full review for more than minimal risk and that involve vulnerable subjects.

The ethical review should be done in formal meetings by all primary reviewers and decision is made only when quorum is complete.

The Committee should meet at regular intervals (Once in three months) and should not keep a decision pending for more than 6 months. Periodic reviews are done as per the SOPs (Standard Operating Procedure).

All the decisions are communicated in writing to the Principal Investigator (PI). Members should be encouraged to attend trainings so that they are aware of all new guidelines and developments.

Elements of review are:

- Design, conduct of the study and approval of review Committees.
- Examination of predictable risks and potential benefits.
- Procedure for selection of subjects including inclusion/exclusion, withdrawal criteria and other issues like advertisement details.
- Management of research related injuries, adverse events and compensation.
- Justification for placebo and availability of products after the study.
- Patient information sheet and informed consent form in English as well as in local language.
- Protection of privacy and confidentiality.
- Plans for data analysis and reporting.
- Adherence to all regulatory requirements and applicable guidelines.
- Competence of investigators, research and supporting staff and facilities.

All documentation & communication of an IEC are dated, filed and preserved up to minimum of three years after completion/termination of the study and strict confidentiality should be maintained during access and retrieval procedures.

COURSEWORK - CREDITS AND EVALUATION FOR PH.D. - APPLIED SCIENCE

Examination and Evaluation Procedure

1. Letter Grading System

As per the UGC guidelines, University follows 10 point letter grading system

CONVERSION OF MARKS INTO GRADE AND GRADE POINT				CLASSIFICATION (SGPA/YGPA/CGPA GRADING)	
MARKS OBTAINED	GRADE	GRADE POINT	DESCRIPTION	GPA	CLASS
<50% Marks	F	0	Dropped	Less than 5.00	Fail
50 to 55% Marks	C	5	Average	5.00 to 5.50	Pass
55.1 to 60% Marks	B	6	Above Average	5.51 to 6.00	Second Class
60.1 to 70% Marks	B+	7	Good	6.01 to 7.00	First Class
70.1 to 80% Marks	A	8	Very Good	7.01 to 8.00	First Class
80.1 to 90% Marks	A+	9	Excellent	8.01 to 9.00	First Class with Distinction
90.1 to 100% Marks	O	10	Outstanding	9.01 to 10.00	First Class with Distinction

(No. of credits * Grade Point)

$$\text{SGPA/YGPA/CGPA} = \frac{\sum \text{-----}}{\text{No. of Credits}}$$

SGPA/YGPA/CGPA is rounded off to the decimal Place.

2. Assessment Procedure

Assessments include both continuous (internal) and summative (final exam). Student has to secure passing marks both in internal and final exam.

Assessment	Internal	Final Exam
Weightage	50 %	50 %
Marks	Test (30 Mark)+Assignment (15 Mark)+ Faculty Assessment (5 mark) = 50	100

3. Examination schedule

- Examination dates are scheduled in consultation with Registrar and Dean of Academics.
- Announcement of examination dates are scheduled forty days prior to the event.
- Dates scheduled are to match with the dates mentioned in the academic calendar. Under unavoidable circumstances, dates for examination may be rescheduled.
- The notification of examination schedule shall also include the tentative dates of theory examinations, which shall be followed by issue of notification of detailed time table for practical examinations.
- All the above-mentioned contents of the notification shall be prominently displayed for information of the candidates.
- In case there is an obligatory holiday declared during the examination days, the examination scheduled on the holiday will be conducted at the end of all the examinations and the date will be announced accordingly.

4. Internal assessment

As per the academic calendar student has to appear for internal tests and successfully complete assignments.

5. Attendance

- To qualify for an examination, 90% of attendance is essential. However up to 80% is the minimum with condonation on medical grounds. The medical certificate is to be produced by the student and the medical officer should be approved by the University.

- b. Under no circumstances, if the attendance is less than 75%, the candidate will not be eligible for the examination

6. Examination application form

Schedule for issue of exam application forms from the University examination department and schedule for submission of application forms will be notified on University website and notice board.

Cumulative Grade Point Average

Based on the grades obtained in all the subjects registered for by a student, his or her cumulative Grade point Average, Semester Grade Point Average (SGPA), Yearly Grade Point Average (YGPA), and Cumulative Grade Point Average (CGPA) is calculated as follows:

- a. Examination forms duly filled, and affixed with latest stamp sized attested photographs of the candidate should be submitted to course office and course office will verify and forward this to the examination department.
- b. Candidates filling up their application late, an amount of fine is collected which is also notified.

7. Hall tickets

- a. Schedule for issue of hall tickets shall be notified by the University.
- b. During exams, candidates are supposed to get the signature from invigilator/external examiner on the space left blank on the column given for the corresponding subject.
- c. Hall ticket and ID cards are mandatory for a candidate to carry for entry into examination hall

8. Malpractice

- a. Candidates are prohibited from writing their names and register number, in any place other than indicated.
- b. Invocation to Gods or any other marks of identification shall not be written anywhere in the answer book.
- c. Candidates shall not bring any book, portion of book, manuscript or paper of any description.
- d. They shall not copy or communicate with anyone inside or outside the hall or exchange of answer books.
- e. Candidates shall not be in possession of cell phones, programmed calculators, pen scanners, blue tooth

equipment or any other equipment which may be used for any kind of malpractice.

- f. Every candidate will be subjected to scrutinizing and scanning before entering the examination hall to see that no piece of paper or unwanted material is taken inside.
- g. If candidates are found to be indulging in malpractice the candidate shall be booked for malpractice and sent out of the examination hall immediately.
- h. The answer book shall be seized, marked as ‘malpractice case’ and signed by the Chief Superintendent and packed and sent separately to the University.

9. Paper evaluation

Theory paper evaluation will be conducted as per the University guidelines. Answer scripts will be coded and each paper will undergo single evaluation (internal faculty) for all courses under Applied Sciences stream.

10. Examination Results

Examination results will be announced within 30 days from the last day of examination. It will be announced on University website.

11. Re-totalling, Re-evaluation and request for Photocopy of the answer script

University will notify the dates, procedure and fees for Re-totalling, Re-evaluation and request for Photocopy of the answer script.

12. Semester Grade Card

On the opening of the semester, within two weeks, Semester grade card will be issued.

13. Consolidated Grade Card

Consolidated grade card will be issued at the end of the Course, after the convocation.

14. Convocation

The final certificate will be issued during the convocation on 12th January of every year.

General Rules and Regulations of the campus

- Attendance for all the events of the University is compulsory for the student.

- Students must wear Identity Card all the times while they are in class or in the campus. Students will not be allowed to enter the class room/dining hall without his/her identity card. In case of damage or loss of the Identity Card, the student must approach the authorized person immediately.
- Indecent clothing is strictly prohibited in the campus. After the class hours, the students should wear decent dresses like Indian traditional attire i.e. Kurta Pyjama for boys and Salwar Kurta for girls. However, students can wear appropriate sportswear/yoga dress while playing indoor/outdoor games or attending yoga sessions.
- Use of tobacco in any form and smoking is strictly prohibited in the campus.
- Gambling in any form such as playing cards (even without money at stake), consumption of non-vegetarian foods, eggs, alcohol, tobacco, drugs, and narcotics and even possession of such things are prohibited. Indulging in such activities would attract severe disciplinary action.
- The security guards are for the safety of the students. Students must behave with all security personnel amicably and with due respect. Any misbehavior with the security personnel is punishable. Politeness under all circumstances is imperative.
- A student must furnish his/her identity card when being asked by any authority of the University.

Ragging

Although the word ragging is unheard in the premises of S-VYASA, Ragging in any form (making unpleasant noise, wanton act, vulgar speech/gestures, doing any act which causes or likely to cause physical or psychological harm or raise apprehension or fear of shame or an embarrassment to any student, which include teasing, abusing, playing practical jokes or causing hurt to such students or asking/demanding any student to do any unethical act) is strictly forbidden. If anyone is found guilty of ragging he/she will be expelled and also liable for prosecution. In the matter pertaining to ragging, the victim's complaint is final for taking disciplinary action.

Acts of Indiscipline and Punitive Action

The University has a high-power Disciplinary Committee, which will look into any act of indiscipline action in campus. The action taken by the Disciplinary Committee will be binding and final.

The acts of indiscipline are categorized under the following:

Category I:

- Ragging in any form;
- All acts of violence and all forms of coercion such as gheraos, sit-ins or any variation of the same which disrupt the normal academic and administrative functioning of the University and or any act which incites or leads to violence;
- Gheraos, laying siege or staging demonstrations around the residence of any member of the University/any office of the university or any other form of coercion, intimidation or disturbance of right to privacy of the residents of the campus;
- Sexual harassment of any kind
- Possession and/or consumption of any intoxicant such as tobacco in any form, alcohol, or any other narcotic substance

Category II

- Committing forgery, tampering with the identity Card or University records, impersonation, misusing University property (movable or immovable), documents and records, tearing of pages of defacing, burning or in any way destroying the books, journals, magazines and any material of library or unauthorized photocopying or possession of library books, journals, magazines or any other material. Hunger strikes, dharnas, group bargaining and any other form of protest by blocking entrance or exit of any of the academic and/or administrative complexes or disrupting the movements of any member of the University community.
- Furnishing false certificates, or false information in any manner to the University.
- Any act of moral turpitude;
- Eve-teasing/Adam teasing or disrespectful behavior or any misbehavior with a girl student, women staff member/visitor;
- Arousing communal, caste or regional feelings or creating disharmony among students;
- Use of abusive, defamatory, derogatory or intimidatory language against any member of the University/Community;
- Causing or colluding in the unauthorized entry of any person into the campus or in the unauthorized occupation of any portion of the University premises; including halls of residence, by any person;

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- Unauthorized occupation of the hostel rooms or unauthorized acquisition and use of University furniture in one's hostel room or elsewhere;
 - Indulging in acts of gambling in the University premises;
 - Consuming or possessing narcotic drugs/ Ganja or other intoxicants in the University premises;
 - Damaging or defacing, in any form, any property of the University or the property of any member of the University community;
 - Not disclosing one's identity when asked to do so by a faculty member or employee of the University/security personnel who is authorized to ask for such identity;
 - Cooking in the hostel premise/campus
 - Improper behavior while on tour or excursion;
 - Any other offence under the law of land;
 - Accommodating unauthorized guests or other persons in the hostels;
 - Engaging in any attempt at wrongful confinement of any member of the faculty, staff, student or anyone camping inside the campus;
 - Any intimidation of or insulting behavior towards a student, staff, or faculty or any other person;
 - Any other act which may be an act of violation of discipline and conduct;

Punitive Actions

The high-power disciplinary committee would decide the appropriate punishment as follows:

- Penalty
- Summoning parents and warning
- One-month suspension from the course/hostel/campus
- Six-months suspension from the course/hostel/campus
- Suspension up to two years from the course/hostel/campus
- Expulsion from the program/University with remark on the certificates

Complaints and Suggestions

The University welcomes any complaints, suggestions or inquiries to improve the facilities provided in the campus.

Ph.D. Coursework – Credits and Syllabus

Credits in Ph.D. – Course Work (Applied Sciences)

Subject Code	Name of the Subject	Credits	Lecture/ Practical (Hrs/week)	Exam in Hrs	IA	Exam
PHRM001	Research Methodology	4	4	3	50	50
PHYG001	Introduction to Yoga Philosophy	4	4	3	50	50
-	Specialisation Paper-I	4	4	3	50	50
-	Specialisation Paper-II	4	4	3	50	50
	Total	16	16		50	50

Specialisation Based Courses Offered for Each Discipline Under Applied Sciences:

CHEMISTRY						
Subject Code	Name of the Subject	Credits	Lecture/ Practical (Hrs/week)	Exam in Hrs	IA	Exam
PHCH101	Advanced Inorganic Chemistry	4	4	3	50	50
PHCH102	Advanced Physical Chemistry	4	4	3	50	50
PHCH103	Analytical Chemistry and Allied Subjects	4	4	3	50	50

MATHEMATICS						
Subject Code	Name of the Subject	Credits	Lecture/ Practical (Hrs/week)	Exam in Hrs	IA	Exam
PHMA101	Computational Mathematics for Machine Learning	4	4	3	50	50
PHMA102	Linear Algebra for Data Science	4	4	3	50	50
PHMA103	Vedic Mathematics for Engineers	4	4	3	50	50

Ph.D. Course Work Syllabus: Applied Science

MANDATORY COURSES

RESEARCH METHODOLOGY								
Course Code	PHRM001	L-P-T-Cr.:	4	0	0	4	Semester:	I
Category:	Programme Elective Course							
Prerequisite:	Introductory knowledge of research fundamentals							
Course Summary:	The Research Methodology course provides a comprehensive foundation in research principles, covering essential topics such as types of research, data collection and analysis, scientific writing, and research ethics. Students will learn to design, conduct, and document research effectively, utilizing quantitative and qualitative methods while adhering to ethical standards. By the course end, students will be equipped with the skills needed for structured, credible research in academic and professional settings.							

Course Outcomes: On completion of the course, the student will be able to

CO1	Understand the Meaning and Importance of Research
CO2	Identify data sources and classify the types of data.
CO3	Create and interpret statistical graphics
CO4	Understand the structure of scientific report and develop a project proposal
CO5	Understand the Role of Research Ethics Committee and practice ethical citation.

Module – I: Introduction to Research
Introduction to Research: Meaning and importance of Research Types of Research Research Design and Stages Selection and Formulation of Research Problem, Objective(s) and Hypothesis Developing Research Plan – Exploration, Description, Diagnosis, Experimentation, Determining Experimental and Sample Design.
Module – II: Data Collection
Data Collection: Sources of Data – Primary and Secondary Types of Data – Categorical (nominal and ordinal), Numerical (discrete, continuous, ratio and interval) Methods of Data Collection: Survey, Interviews (in-depth or Key Informant interviews), Focus Group Discussion (FGD), Observation, Records or Experimental Observations.
Module – III: Data Processing and Analysis
Data Processing and Analysis: Statistical Graphics – Histograms, Frequency Polygon, Ogive, Dotplots, Stemplots, Bar Graphs, Pareto Charts, Pie Charts, Scatterplots, Boxplots Descriptive Analysis – Frequency Distributions, Measures of Central Tendency, Measures of Variation/Dispersion, Skewness and Kurtosis, Measures of Relative Standing Qualitative Approaches Including Grounded Theory, Ethnography, Narrative Inquiry, Phenomenology and Case-Study.
Module – IV: Scientific Writing
Scientific Writing: Structure and Components of Scientific Reports – Types of Report – Technical Reports and Thesis – Significance – Different steps in the preparation – Layout, Structure and Language of Typical Reports – Illustrations and Tables – Bibliography, Referencing and Foot Notes. Preparation of the Project Proposal – Title, Abstract, Introduction – Rationale, Objectives, Methodology – Time frame and Work Plan – Budget and Justification – References.

Module – V: Research Ethics

Research Ethics: Research Ethics Committees/Institutional Review Board – Roles and Importance
 Intellectual Property rights – Commercialization, Royalty Reproduction of Published Material – Citation and Acknowledgement, Plagiarism.

TEXT BOOKS:

1. Research Methodology – C.R. Kothari
2. Dipankar Deb • Rajeeb Dey, Valentina E. Balas “Engineering Research Methodology”, ISSN 1868-4394 ISSN 1868-4408 (electronic), Intelligent Systems Reference Library, ISBN 978-981-13- 2946-3 ISBN 978-981-13-2947-0 (eBook), <https://doi.org/10.1007/978-981-13-2947-0>
3. Intellectual Property A Primer for Academia by Prof. Rupinder Tewari Ms. Mamta Bhardwa.

REFERENCE BOOKS:

1. David V. Thiel “Research Methods for Engineers” Cambridge University Press, 978-1-107-03488- 4
2. Intellectual Property Rights by N.K.Acharya Asia Law House 6th Edition. ISBN: 978-93-81849-30-9

MANDATORY COURSES

INTRODUCTION TO YOGA PHILOSOPHY								
Course Code	PHYG001	L-P-T-Cr.:	4	0	0	4	Semester:	I
Category:	Programme Elective Course							
Prerequisite:	Basic Understanding of Yoga Practice							
Course Summary:	The goal of teaching Yoga Philosophy to postgraduate students is to give comprehensive knowledge about therapeutic basis of yoga as mentioned in ancient literature including Vedās, Upanishads, Bhagavad Gita and shat darshanas etc.							

Course Outcomes: On completion of the course, the student will be able to

CO1	Explain the hidden concepts available in the ancient yogic texts
CO2	Understand the yogic principles of Yoga therapy
CO3	Appreciate the contributions of the Yogis
CO4	Understand the fold of afflictions and means to overcome them
CO5	Explain the essence of Vedas and Upanishads

Module – I:

Introduction to Vedas and Upanishads: Historical facts about Vedas: Dating and Authoring of Vedas, Content of Vedas, Vedas in brief: Jnana Kanda – Prasthanas Traya – Upanishads and Vedanta Texts (Taittiriya, Katha, Mandukya, Yoga Vasistha), Karma Kanda - Types of Karma, Performance of Karma, Results of Karma, Theory of Karma, Upanishad Prakriyas (10 upanishads teaching techniques) in brief

Module – II:

Yoga Philosophy in Upanishads: Main Human quests: Who am I (Panchakosha Viveka) – Understanding Consciousness through Indian Philosophy, Ananda Mimamsa – Happiness Analysis and Measuring Ananda – ,Energy Model
Module – III:
Yoga Philosophy in Upanishads: Concept of Dharma – Literal Meaning of Dharma, Nyaya vs Dharma, Varna and Ashrama Dharma – Social Dharma and Life journey, Varna and Ashrama Dharma – Possible conflicts of Dharma and answers
Module – IV:
Darshnas: Astika Darshanas: Sankhya, Yoga, Nyaya, Veisheshika, Mimamsa, Vedanta – Yoga Vasista, Narada Bhakti Sutras Nastika Darshanas, Charvaka, Jaina, Boudha
Module – V:
Bhagavadgita: Concept of Guna, Concept of Yajna, Concept of Atma, Concept of Atma Swaroopa, Concept of Sankhya (Creation), Concept of Sthita Prajna, Concept of Food and its classification, Concept of psycho analysis, Concept of Guna traya Vibhaga and Shraddha traya
TEXT BOOKS: 1. The Vedas - by Chandrasekharendra Saraswati (2014), Bhavan’s Publication Bhagavad Gita 2. Yoga its basis and applications - by Dr. H.R. Nagendra – SVYP
REFERENCE BOOKS: 1. Let Go – Discover lasting happiness – Prof A. Satyanarayana Sastry – SVYP

2. Integrated Approach of Yoga Therapy for Positive Health – Dr R Nagaratna and Dr H R Nagendra – SVYP
3. Bhagawat Gita Shatdarshana – Sw Sukhabodhananda – RK Mat publications Narada Bhakti Sutras – Sw Harshananda – RK Mat publications

**SPECIALISATION BASED COURSES OFFERED FOR EACH DISCIPLINE UNDER
APPLIED SCIENCES**

BRANCH: CHEMISTRY

ADVANCED INORGANIC CHEMISTRY								
Course Code	PHCH101	L-P-T-Cr.:	4	0	0	4	Semester:	I
Category:	Programme Elective Course							
Prerequisite:	Solid foundation in general and inorganic chemistry							
Course Summary:	This course provides an in-depth exploration of advanced concepts in inorganic chemistry, covering transition and non-transition element chemistry, organometallic compounds, nuclear chemistry, and the role of metal compounds in medicine.							

Course Outcomes: On completion of the course, the student will be able to

CO1	Describe the fundamental principles of coordination chemistry, and stereochemistry of coordination compounds involving transition metal ions.
CO2	Discuss the general properties of non-transition elements, emphasizing their unique chemical behavior and trends across the periodic table.
CO3	Describe the use of metal compounds in diagnostic and therapeutic applications, with a focus on the role of metal-based drugs in chemotherapy and anticancer treatments.
CO4	Analyze and predict the mechanisms of key reactions in organometallic chemistry, including oxidative addition, reductive elimination, and insertion and elimination processes.
CO5	Analyze the mechanisms of photonuclear reactions and their applications in nuclear science and technology.

Module – I: Chemistry of transition elements Chemistry of transition elements: Coordination chemistry of transition metal ions, Stereochemistry of coordination compounds, Crystal field theory for tetrahedral, octahedral, square pyramidal and square planar complexes, Splitting of d- orbital's, Crystal field stabilization energy (CFSE), Factors affecting the crystal field parameters, Strong and weak field complexes, Spectrochemical series, Jahn-Teller effect.
Module – II: Chemistry of Non-transition Elements Chemistry of Non-transition Elements: General discussion on the properties of the nontransition elements, Synthesis, properties and structure of boranes, Carboranes, borazines, silicates carbides, silicones, phosphazenes, sulphurnitrogen compounds: peroxo compounds of boron and carbon, interhalogens pseudohalides and noble gas compounds.
Module – III: Metal Compounds in Medicine Metal Compounds in Medicine: Medicinal use of metal complexes as antibacterial, anticancer, use of cis-platin as antitumor drug, antibiotics & related compounds. Metal deficiency and disease, iron deficiency, zinc deficiency and copper deficiency, Metal used for diagnosis and chemotherapy with reference to anti-cancer drugs. Chelate therapy, chemotherapy with compounds of some non-essential elements; platinum complexes in cancer therapy.
Module – IV: Organometallic Chemistry Organometallic Chemistry: Synthesis, bonding, structure and reactivity of organometallic compounds, Classification of organometallic compounds based on hapticity and polarity of M-C bond, Nomenclature and general characters, 18 electron rule, applications and exceptions, Reactions of organometallic compounds: Oxidative addition, reductive elimination, Insertion and elimination.
Module – V: Nuclear Chemistry

Nuclear Chemistry: Production of projectiles, nuclear cross section, nuclear dynamics, threshold energy of nuclear reaction, Coulomb scattering, potential barrier, potential well, formation of a compound nucleus, Nuclear reactions, direct Nuclear reactions, heavy ion induced nuclear reactions, photonuclear reactions. Liquid drop model of fission, fission barrier and threshold, fission cross section, mass energy and charge distribution of fission products, symmetric and asymmetric fission, decay chains and delayed neutrons.

TEXT BOOKS:

1. J. H. Huheey, Inorganic Chemistry-Principles, structure and reactivity, Harper and Row Publisher, Inc. New York (1972).
2. Drago: Physical methods of Inorganic Chemistry. J. Wiley.
3. Graddon: Introduction to coordination Chemistry, Parasmom
4. Friedlander, Kennedy and Miller, Nuclear and Radio Chemistry: John Wiley

REFERENCE BOOKS:

1. J. D. Lee, Concise Inorganic Chemistry, Elbs with Chapman and Hall, London
2. A. R. West, Plenum, Solid State Chemistry and its applications
3. Lewis and Wilkins: Coordination Chemistry. J. Wiley
4. B.G. Harvey, Introduction to Nuclear Physics and Chemistry
5. Hassinsky: Translated by D. G. Tuck, Nuclear Chemistry and its application: Addison Wiley

SPECIALISATION BASED COURSES OFFERED FOR EACH DISCIPLINE UNDER APPLIED SCIENCES

BRANCH: CHEMISTRY

ADVANCED PHYSICAL CHEMISTRY								
Course Code	PHCH102	L-P-T-Cr.:	4	0	0	4	Semester:	I
Category:	Programme Elective Course							
Prerequisite:	Foundational understanding of general and physical chemistry							
Course Summary:	The course offers an integrated exploration of various spectroscopic techniques, including rotational, infrared, Raman, and electronic spectroscopy, providing students with a comprehensive understanding of molecular behavior and interactions with electromagnetic radiation.							

Course Outcomes: On completion of the course, the student will be able to

CO1	Analyze complex rate equations for reactions involving reverse, parallel, consecutive, and chain mechanisms, and understand the dynamics of branching chains and explosions.
CO2	Explain the formation and properties of micelles and reverse micelles, including solubilization, micellar catalysis, and the thermodynamics of micellization.
CO3	Analyze spectral transitions by understanding transition probabilities, as well as the factors influencing the width and intensity of spectral lines.
CO4	Understand the principles of infrared and Raman spectroscopy for molecular characterization and structure determination.
CO5	Explain the vibrational and rotational fine structure of electronic bands, demonstrating an understanding of how these features contribute to the overall spectrum.

Module – I: Chemical Kinetics
Chemical Kinetics: Differential and integral rate equations for zeroth, first, second and fractional order reactions; Rate equations involving reverse, parallel, consecutive and chain reactions; Branching chain and explosions; effect of temperature and pressure on rate constant. Study of fast reactions by stopflow and relaxation methods. Collisions and transition state theories.
Module – II: Colloidal Systems
Colloidal Systems-Sols, Lyophilic and lyophobic sols, properties of sols, coagulation. Sols of surface active reagents, surface tension and surfactants, electrical phenomena at interfaces including electrokinetic effects, micelles, reverse micelles, solubilization. Thermodynamics of micellization, critical micelle concentration, factors affecting critical micelle concentration (cmc), experimental methods of cmc determination, Micellar catalysis. Adsorption, adsorption isotherms, methods for determining surface structure and composition, BET equation, surface area determination
Module – III: Introduction to Spectroscopy and Rotational Spectroscopy
Introduction to Spectroscopy and Rotational Spectroscopy: Characterization of electromagnetic radiation. The qualification of energy. Regions of Spectrum, transition probability, the width and intensity of spectral transitions. Classification of molecules according to their moment of inertia. Rotational spectra of rigid and non rigid diatomic molecules, The effect of isotopic substitution.
Module – IV: Infrared and Raman Spectroscopy
Infrared and Raman Spectroscopy: 1) Molecules as harmonic oscillator, Morse potential energy function, vibrational spectrum, fundamental vibrational frequencies. Force constant, zero point energy, isotope effect. The anharmonic oscillator, the diatomic vibrating rotator, the interactions of rotations and vibrations. Polyatomic molecules: Fundamental vibrations and their symmetry, overtone and combination

frequencies. Rayleigh scattering. Raman Scattering, classical and quantum theories of Raman effect. Rotational Raman Spectra for linear and symmetric top molecules. Vibrational Raman Spectra, rotational fine structure. Polarization of light and the Raman effect. Structure determination from Raman and Infra-red spectroscopy.

Module – V: Electronic Spectroscopy

Electronic Spectroscopy: General nature of band spectra. Beer- Lambert Law integrated absorption coefficient and oscillator strength. Term symbols for atoms, The hydrogen atom and hydrogen like species spectrum. Sequences and progressions, the vibrational course structure and rotational fine structure of electronic band. The Franck-Condon principle, dissociation energy and dissociation products.

TEXT BOOKS:

1. Physical Chemistry – P. W. Atkins, Oxford University press, 8th edition, 2006
2. Text book of Physical Chemistry – S. Glasstone.
3. Principles of Physical Chemistry – Marron and Pruton
4. Fundamental of molecular spectroscopy by C. N. Banwell, E. M. McCash, Vth Edn., Tata McGrew Hill (2013).

REFERENCE BOOKS:

1. Physical Chemistry by P. W. Atkins, J. D. Paula, IXth Edn., Oxford University Press (2010).
2. Physical Chemistry – G. M. Barrow, Tata-McGraw Hill, Vth edition, 2003.
3. Thermodynamics for Chemists – S. Glasstone, D. Van Nostrand , 1965.
4. Introduction to spectroscopy by D. L. Pavia, G. M. Lapmann, G. S. Kriz, IIIrd Edn., Thomson (2006).

BRANCH: CHEMISTRY

ANALYTICAL CHEMISTRY AND ALLIED SUBJECTS								
Course Code	PHCH103	L-P-T-Cr.:	4	0	0	4	Semester:	I
Category:	Programme Elective Course							
Prerequisite:	Foundational understanding of general and Analytical chemistry							
Course Summary:	This course aims to provide a comprehensive overview of analytical and synthesis techniques essential for chemistry and nanotechnology.							

Course Outcomes: On completion of the course, the student will be able to

CO1	Understand the safety protocols for handling, storing, and disposing of hazardous chemicals and differentiate between types of errors.
CO2	Analyze and interpret acid-base titration curves and select suitable redox indicators for effective titration.
CO3	Derive and apply Beer-Lambert's law, including concepts of molar absorptivity, Sandell sensitivity, and use of Ringbom plots to determine the concentration of analytes
CO4	Explain the foundational concepts, history, and interdisciplinary nature of nanoscience and assess their applications across fields
CO5	Understand the principles of template-based synthesis techniques

Module – I: Safety measures in chemical laboratories And Errors in Chemical Analysis

Safety measures in chemical laboratories, Fire hazards, toxic chemicals: Acids/bases/solvents handling, storage, dilution, disposal of chemicals, acid/ solvent bottles etc. Material Safety Datasheet.

Errors in chemical analysis: absolute, relative error, random error distribution, Gaussian curve, Limitations of analytical methods, determinate and indeterminate errors, minimization of errors. Accuracy and precision, distribution of random errors, the normal error curve. Statistical treatment of finite samples - measures of central tendency and variability: mean, median, range, standard deviation, variance, confidence limits, Comparison of an experimental mean and a true mean. F-test, rejection of result - Q-test, Student's t-test, numerical problems.

Module – II: Quantitative Analysis

Quantitative Analysis: Introduction, general terms in volumetric analysis, indicators, indicator theory, choice of indicators. Acid-base titrations, titration curves with example, Buffer solutions, acid-base equilibria in polyprotic acids, amino acids, carbonates, bicarbonates, mixture of two acids. Complexometric titrations-stability of complexes, metal-ion buffer, titrations involving unidentate and multidentate ligands. Precipitation titrations and solubility equilibria, indicators, factors affecting solubility, applications of precipitation titrations. Oxidation-reduction equilibria and applications, Nernst equation, titration curves, redox indicators. Advantages and disadvantages of gravimetric analysis.

Module – III: Instrumental Methods in Quantitative Analysis

Instrumental Methods in Quantitative Analysis: Electromagnetic radiation, interaction with matter, absorption, Beer-Lambert's law, derivation, molar absorptivity, Sandell sensitivity, Ringbom plot, deviations, limitations, Calibration with standards, standard addition, internal standard addition, limit of detection, limit of quantification, Instrumentation, radiation sources, wavelength selection devices, optical slits, single beam and double beam instruments, photo electric colorimeter, scanning devices, merits and limitations, numerical problems on application of Beer's law.

Module – IV: Nano Technology

Nano Technology: Introduction to Nanoscience; History and Scope, Interdisciplinary nature, Structure of nanomaterials, Quantum wells, quantum wires, quantum dots, fullerenes, graphite, carbon nanotubes, inorganic nano wires, nano particles, core - shell nano particles. Nanooptoelectronic materials and devices, medicine and pharmacology applications, thin-films, One Dimensional Nanostructures, Nano wires and nano rods, Spontaneous growth: Evaporation and condensation growth, vapor-liquid-solid growth, stress induced recrystallization.

Module – V: Template Based Synthesis of Nanomaterials

Template Based Synthesis of Nanomaterials: Electrochemical deposition, Electro-phoretic deposition. Two dimensional nano-structures, Fundamentals of film growth. Physical vapour Deposition (PVD): Evaporation molecular beam epitaxy (MBE), Sputtering, Comparison of Evaporation and sputtering. Chemical Vapour Deposition (CVD). Wet chemical synthesis methods: sol-gel, hydrothermal, coprecipitation and solution combustion methods.

TEXT BOOKS:

1. Instrumental Methods of analysis- Willard, Merrit, Dean and Settle.
2. Analytical Chemistry: (J.W) G. D. Christain.
3. Nanomaterials: AK Bandyopadhyay: Newage International (p) limited publishers
4. Nanomaterials J Dutta and H Hofmann, AK Bandyopadhyay, Newage International (p) limited 1st Edition,2011.
5. Principles of Physical Chemistry – Marron and Pruton
6. Fundamental of molecular spectroscopy by C. N. Banwell, E. M. McCash, Vth Edn., Tata McGrew Hill (2013).

REFERENCE BOOKS:

1. Instrumental Methods of analysis (CBS)- H.H . Willard, L.L. Merrit, J.A. Dean
2. Physical Chemistry – G. M. Barrow, Tata-McGraw Hill, Vth edition, 2003.
3. Nanostructured materials processing, properties and applications Carl C Koch Jaico publishing house 1st Edition, 2006

SPECIALISATION BASED COURSES OFFERED FOR EACH DISCIPLINE UNDER APPLIED SCIENCES

BRANCH: MATHEMATICS

Computational Mathematics for Machine Learning								
Course Code	PHMA101	L-P-T-Cr.:	4	0	0	4		
Category:	Programme Elective Course							
Prerequisite:	Concepts of Linear algebra, matrices, probability, calculus.							
Objective:	- To build a strong foundation in mathematics to understand Machine learning. - To develop innovative Machine learning /deep learning algorithms.							
CO1	Demonstrate a solid grasp of linear algebra, including vector spaces, matrices, eigenvalues, eigenvectors, and singular value decomposition (SVD).							
CO2	Apply calculus concepts (derivatives, gradients, optimization techniques) to solve problems in machine learning, such as gradient descent.							
CO3	Utilize probability theory and statistical concepts to model uncertainty and make informed decisions.							
CO4	Implement machine learning algorithms using appropriate programming languages (Python, R, etc.) and libraries (NumPy, SciPy, TensorFlow, PyTorch).							
CO5	Design and implement machine learning models for various tasks, including classification, regression, clustering, and dimensionality reduction.							

Module-1: Linear Algebra

Vector space: Introduction vector spaces, vector subspaces-Properties, basis and dimensions. Linear transformations, Norms, orthogonal complements and Projection operator. Eigen pairs and properties.

Matrices: Special matrices and Properties, Least Square approximation and minimum norm solution. Quadratic forms, Positive semi-definite(PSD) matrices, Positive definite(PD). Singular Decomposition: Eigen decomposition of square matrix, spectral decomposition, singular value decomposition, properties and Applications. Low rank approximations, Gram Schmidt process, polar decomposition

Module – 2 : Principal Component Analysis

Principal Component Analysis-I, Principal Component Analysis-II, Linear Discriminant Analysis, Minimal polynomial and Jordan Canonical form-I, Minimal polynomial and Jordan Canonical form-II

Module – 3 : Probability

Basics of Probability, Random Variables, Expectations and Variance Conditional probability, Baye's Theorem and, Probability distributions. Joint Probability distribution and covariance.

Module - 4 : Calculus

Basic concepts of Calculus, Convex sets and Functions, Properties of convex functions.

Module – 5 –: Optimization Techniques

Unconstrained Optimization, Constrained optimization-I, Constrained optimization-II, Steepest Descent method, Newton's and Penalty function method.

TEXT BOOKS:

1. Mathematics for Machine Learning by Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong.
2. Pattern Recognition and Machine Learning by Christopher M. Bishop.

REFERENCE BOOKS:

1. Linear Algebra Done Right by Sheldon Axler.
2. Probability Theory: The Logic of Science by E. T. Jaynes.
3. Convex Optimization by Stephen Boyd and Lieven Vandenberghe.

WEB REFERENCES:

- [All Machine Learning Models Explained in 5 Minutes | Types of ML Models Basics](#) by Learn with Whiteboard
- [Machine learning and AI is extremely easy if you learn the math: My rant.](#) by ChemCoder

SPECIALISATION BASED COURSES OFFERED FOR EACH DISCIPLINE UNDER APPLIED SCIENCES

BRANCH: MATHEMATICS

Linear Algebra for Data Science.								
Course Code	PHMA102	L-P-T-Cr.:	4	0	0	4	Semester:	
Category:	Programme Elective Course							
Prerequisite:	Fundamental of Linear Algebra							
Objective:	- Understand the fundamentals of linear algebra - Apply linear algebra concepts to data science problems - Develop problem-solving skills							

CO1	Understand and apply fundamental concepts of linear algebra, including vectors, matrices, matrix operations, determinants, eigenvalues, and eigenvectors.
CO2	Represent data as vectors and matrices, and perform operations on these representations.
CO3	Utilize linear algebra to solve systems of linear equations and understand their applications in data science.
CO4	Apply linear algebra techniques for dimensionality reduction and feature selection.
CO5	Understand the mathematical foundations of various machine learning algorithms

Module – 1: Introduction to Vectors and Matrices

Vector Basics: Definition, properties, operations, geometric interpretation.

Matrix Basics: Definition, types, operations (addition, subtraction, multiplication), transpose, inverse.

Linear Systems of Equations: Solving systems using Gaussian elimination, matrix inversion, Cramer's rule.

Module – II: Vector Spaces and Subspaces

Vector Spaces: Definition, properties, examples ($\mathbb{R}^n$, polynomial space, function space).

Subspaces: Definition, span, basis, dimension.

Linear Independence and Dependence: Determining if vectors are linearly independent, finding bases for subspaces.

Module – III: Eigenvalues and Eigenvectors

Eigenvalues and Eigenvectors: Definition, calculation, properties.

Eigenvalue Decomposition: Diagonalization of matrices, applications.

Spectral Theorem: Properties of real symmetric matrices, applications in data analysis.

Module – IV: Matrix Factorizations

Singular Value Decomposition (SVD): Definition, properties, applications (dimensionality reduction, image compression).

Principal Component Analysis (PCA): Using SVD for dimensionality reduction and feature extraction.

QR Decomposition: Applications in least squares problems and solving linear systems.

Module – V: Numerical Linear Algebra

Matrix Norm and Condition Number: Understanding matrix properties and their impact on numerical stability.

Iterative Methods for Solving Linear Systems: Jacobi, Gauss-Seidel, Conjugate Gradient methods.

Numerical Linear Algebra Libraries: Introduction to libraries like NumPy and SciPy

TEXT BOOKS:

1. Linear Algebra for Data Science by Gilbert Strang
2. Introduction to Linear Algebra by Gilbert Strang

REFERENCE BOOKS:

1. The Elements of Statistical Learning: Data Mining, Inference, and Prediction by Trevor Hastie, Robert Tibshirani, and Jerome Friedman.
2. Linear Algebra: A Modern Introduction by David Poole
3. Matrix Computations by Gene H. Golub and Charles F. Van Loan

WEB REFERENCES:

1. <https://www.coursera.org/learn/multivariate-calculus-machine-learning>
2. <https://www.coursera.org/learn/datasciencemathskills>
3. [A friendly introduction to linear algebra for ML \(ML Tech Talks\)](#) by TensorFlow
4. [Linear Algebra For Data Science And Machine Learning | Linear Algebra Tutorial | Simplilearn](#) by Simplilearn
5. [Linear Algebra for Data science](#) by NPTEL-NOC IITM

SPECIALISATION BASED COURSES OFFERED FOR EACH DISCIPLINE UNDER APPLIED SCIENCES

BRANCH: MATHEMATICS

Vedic Mathematics for Engineers								
Course Code	PHMA103	L-P-T-Cr.:	4	0	0	4		
Category:	Programme Elective Course							
Prerequisite:	Concepts of Basic algebraic operations, trigonometry, calculus, numerical methods.							
Objective:	This course aims to solve engineering problems using Vedic techniques, comparing Vedic methods with traditional methods in terms of efficiency and accuracy.							

CO1	To learn techniques for quick mental calculations, reducing reliance on calculators.
CO2	To develop creative and logical thinking skills, leading to innovative solutions.
CO3	To Provide a unique perspective on mathematical concepts, fostering better comprehension.
CO4	To Enhance self-esteem and motivation through the mastery of advanced techniques.
CO5	To offer practical applications in various engineering fields, improving efficiency and accuracy.

Module – 1: Vedic Mathematics in Engineering Problems.

History and Philosophy: Origin and development of Vedic Mathematics, Philosophical underpinnings and its relevance to modern mathematics.

Basic Principles and Sutras: Core principles and their applications, Introduction to the 16 Sutras and 13 Sub-sutras, Understanding the underlying logic and intuition.

Addition and Subtraction: Vertical and crosswise addition and subtraction, Techniques for quick mental calculations.

Multiplication: Nikhilam Sutra and its variations, Urdhva-Tiryak multiplication, Multiplication of numbers near powers of 10.

Division: Dhvajank Sutra for long division, Quick division techniques,

Square Roots and Cube Roots: Efficient methods for calculating square and cube roots, Applications in engineering calculations.

Module – II: Vedic Mathematics for Algebraic Operations

Algebraic Equations: Solving linear and quadratic equations using Vedic techniques, Applications in circuit analysis and control systems.

Polynomial Operations: Multiplication and division of polynomials, Factorization techniques.

Simultaneous Equations: Vedic methods for solving systems of linear equations, Applications in structural analysis and fluid mechanics

Module – III: Vedic Mathematics for Trigonometry

Trigonometric Identities: Vedic techniques for deriving and remembering trigonometric identities,

Applications in signal processing and communication systems. Trigonometric Ratios: Quick calculation of trigonometric ratios using Vedic methods, Applications in surveying and geodesy.

Solution of Triangles: Vedic approaches to solving triangles., Applications in mechanical engineering and robotics.

Module – IV: Vedic Mathematics for Calculus

Differentiation: Vedic techniques for finding derivatives of functions, Applications in optimization and control systems.

Integration: Vedic methods for integration of functions, Applications in fluid mechanics and heat transfer.

Differential Equations: Solving differential equations using Vedic techniques, Applications in control systems and signal processing.

Module – V: Vedic Mathematics for Numerical Methods

Root Finding Techniques: Vedic methods for finding roots of equations, Applications in numerical analysis.

Numerical Integration and Differentiation: Vedic techniques for numerical integration and differentiation, Applications in computational fluid dynamics and finite element analysis.

TEXT BOOKS:

1. Linear Algebra for Data Science by Gilbert Strang
2. Introduction to Linear Algebra by Gilbert Strang

REFERENCE BOOKS:

1. The Elements of Statistical Learning: Data Mining, Inference, and Prediction by Trevor Hastie, Robert Tibshirani, and Jerome Friedman.
2. Linear Algebra: A Modern Introduction by David Poole
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WEB REFERENCES:

1. <https://www.coursera.org/learn/multivariate-calculus-machine-learning>
2. <https://www.coursera.org/learn/datasciencemathskills>

3. [A friendly introduction to linear algebra for ML \(ML Tech Talks\)](#) by TensorFlow
4. [Linear Algebra For Data Science And Machine Learning | Linear Algebra Tutorial | Simplilearn](#) by Simplilearn
5. [Linear Algebra for Data science](#) by NPTEL-NOC IITM