



# VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY NAGPUR – 440 010

## M.Sc. Programme (2016-18) Information Brochure

**Admission to M.Sc.(Physics), M.Sc. (Chemistry) and M.Sc.(Mathematics) through CCMN-2016**

### 1.0 General: About the Institute:

Visvesvaraya National Institute of Technology (VNIT), Nagpur is one of the thirty one National Institutes of Technology in the country. National Institutes of Technology Act, 2007 (29 of 2007)) declared VNIT Nagpur as an Institute of National Importance along with all other NITs. The Act was brought into force from 15<sup>th</sup> August 2007. Earlier, the Institute was known as Visvesvaraya Regional College of Engineering (VRCE). It was established in the year 1960 under the scheme sponsored by Govt. of India and Govt. of Maharashtra. The Institute is named after the eminent engineer, planner and statesman of the country Bharat Ratna 'Sir M. Visvesvaraya'.

Institute offers B. Tech. degree in eight disciplines, B.Arch degree, M. Tech. degree in eighteen disciplines of Engineering and M.Sc degree in three disciplines. Admissions to UG and PG programmes are on the basis of JEE (Main) and GATE scores respectively. UG and PG programmes are credit based and a number of electives are offered to the students. About 3000 UG and 300 PG students are pursuing studies for the degrees. Institute offers Ph. D programs in various streams of Engineering, Science, Humanities and Architecture. Institute has highly qualified faculty strength of more than 200. Good testing, computing and consultancy facilities are also available. Institute has good Training & Placement Section and more than 90% students get the placement through campus interviews. Institute has collaboration with TIFR, IISc, NEERI, JNARDDC, IIT Kanpur, IIT Mumbai, BRNS, IGCAR etc. for research and other academic activities. VNIT has excellent residential facilities to cater the need of more than three thousand students. There are **8** boys hostels and **4** girls hostels, catering to the needs of UG and PG students.

### Achievements of M.Sc students in last two years:

**M.Sc Physics:** **5** students have qualified **GATE** + **1** qualified (**JEST & JRF**) + **2** students were selected by **INFOSIS** during campus interviews.

**M.Sc Chemistry:** **12** students have qualified **GATE** + **3** students have qualified **NET** + **1** student got admission to Ph.D programme at Germany.

**M.Sc Mathematics:** **4** students have qualified **GATE** + **1** student has qualified **NET** + **1** student got admission to Ph.D programme at UK.

## **2.0 About the Course:**

### **Two year full time M.Sc. programme in Physics, Chemistry and Mathematics**

Science is basic foundation of any technological and engineering creation. In view of the changing scenario at national and international level in field of Science and Technology, there is great demand for basic sciences with considerable knowledge of its applications. VNIT is committed to high academic standards. The M.Sc. courses are designed for four semesters (two years) in such a way that a good basic foundation of subjects is laid and applications along with recent developments are covered. Relative grading will be followed and credits will be allotted based on academic performance. Students will also get theoretical and practical knowledge of computer programming. These M.Sc. programmes provide opportunity to make career in R&D, industries and academic institutions. Opportunity for the placement may be provided by the Institute. For detail scheme M.Sc programmes refer Annexure-I.

#### **I ) M.Sc.(Physics) Programme:**

M.Sc. (Physics) programme imparts hands on training in theoretical as well as practical aspects of physics, so that student's ability to tackle physics problems is inculcated in them. This programme lays thrust on fundamentals of core and applied subjects of Physics and also provides knowledge on topics of current interest.

In the M.Sc. programme, total 15 theory courses will be taught over four semesters. There will be a seminar and a project. The department has well equipped labs to provide practical skills to students.

Classical, Quantum and Statistical Mechanics and Solid State Physics lay a basic foundation in core subjects of Physics. Courses such as Electronics, Characterization techniques, Materials Science, Thin film techniques and Nanomaterials provide knowledge of applied topics and cover topics of recent interest also. Computer programming will also be taught. Students can look forward to a career in teaching, industry and research. To aid in teaching career, NET syllabus is covered.

#### **I I) M.Sc.(Chemistry) Programme:**

The special feature of M.Sc. (Chemistry) is a good foundation of basics and research component through practical skills, which in turn will provide excellent job prospects in Academics, Industries and other field of interest. M.Sc. (Chemistry) will provide competence to tackle frontier area in Green chemistry, Supramolecular chemistry, Sensors, Advanced materials and Advanced organic chemistry.

Two years M.Sc programme in Chemistry will be conducted in four semesters. Communication Skill has been proposed as an audit course in first semester, which will help students develop better expression. In addition to theory and practical courses project phase – I and computational chemistry lab will be introduced in third semester. Fourth semester has two electives courses, basics of electronics and project phase-II. Nine electives have been incorporated in the course considering variety of advanced interest.

### III ) M.Sc.(Mathematics) Programme:

The objective of the M. Sc. (Mathematics) is to develop highly qualified/trained mathematicians to cater to the needs of the industry, teaching and research institutions. Department of Mathematics has highly qualified, motivated, dynamic and experienced faculty members. The M.Sc.(Mathematics) programme intended to offer a balanced combination of core and applied courses of Mathematics. It also emphasizes advanced developments in the field of analysis, fluid mechanics, mathematical physics and scientific computing. This M.Sc. programme is designed for four semesters. In the first semester a course of Introduction to Computer Programming and another course of communication skill are included which will be helpful to students in their professional career. In addition to the regular courses, three electives courses in third and fourth semesters are available for the students. There is provision for each student to give a seminar in 3<sup>rd</sup> semester and complete a dissertation in fourth semester under the guidance of highly qualified faculty members. In these activities, student explores a specific topic, surveys the available literature and submits a critical review in the form of a report which may also include original theoretical results and/or results of experimental work. This process provides an initiation into mathematical research and also equips the student with the skills of presentation of research/technical report. This will be useful in developing awareness, aspiration and innovative ability to solve new scientific problems.

#### 3.0 Eligibility & Admission Procedure :

The admissions for the M.Sc Programmes for the Academic Year 2016 will be through Centralized Counseling for M.Sc. Admissions (CCMN-2016) based on the IIT-JAM score.

The vacant seats after CCMN-2016 National spot round (NSR), if any, will be filled through the **Institute Written Test** conducted by VNIT on **Sunday, 29<sup>th</sup> May, 2016. This test will be open for all the candidates irrespective of whether they have appeared for JAM or not.** Registration at CCMN-2016 website is not necessary to apply for the VNIT Institute written test.

The information of all participating institutes, Seat matrix, Fee structure, Special eligibility and registration procedure is available in website: [www.ccmn.in](http://www.ccmn.in)

B.Sc/ Bachelors degree with minimum 60% marks aggregate or equivalent grade [55% in case of candidates from reserved category (SC/ST/PH)] with Physics/Chemistry/Mathematics as one of the main subject to be eligible for the respective course.

#### Requirement for admission:

Course	Eligibility Requirement
M.Sc.(Physics)	Candidate should have <b>Physics</b> at B.Sc./Bachelor degree Level in all the three years along with Mathematics as one of the subjects
M.Sc. (Chemistry)	Candidate should have <b>Chemistry</b> at B.Sc./Bachelor degree Level in all the three years and any other combination + Mathematics at 10+2 level is essential
M.Sc.(Mathematics)	Candidate should have <b>Mathematics</b> at B.Sc. /Bachelor degree Level in all the three years and any other combination

Candidate appearing in the final year of B.Sc. degree may also apply. Such candidate, if selected for admission, should produce an authentication letter from the competent authority stating that his/ her result is awaited. However, the candidate will have to submit the mark sheet of the final year of B.Sc. degree by 30<sup>th</sup> September, 2016 failing which his/ her admission stands cancelled. It is hereby clarified that this facility is not available to candidates who have appeared for supplementary, backlog or any improvement paper.

#### 4.0 Seat Matrix : Availability of seats

Department	Program		Number of Seats								
	Name	Duration (Years)	OC	OB	SC	ST	OC-PWD	OB-PWD	SC-PWD	ST-PWD	Total
Physics	M.Sc	2	10	5	3	2					20
Chemistry	M.Sc	2	10	6	3	1					20
Mathematics	M.Sc	2	10	5	3	1	1				20

Reservation as per Government of India Rules.

#### 5.0 Category Rules

- Reservation as per Government of India Rules
- **If a candidate is not able to produce required category certificate (OBC/SC/ST/PWD) or the certificate is found invalid, his/her category will be changed to OPEN category during the time of admission.**
- For Maharashtra candidates, caste validation certificate is essential to claim the category benefits.
- For **OBC** candidates latest non-creamy layer certification is mandatory without which they will not be considered for OBC category and treated as General category candidate.
- For candidates coming under Persons with Disabilities (**PWD**) category, a minimum of 40% disability is required subject to the condition that the candidate is capable of carrying out activities related to theory and practical work as applicable to course. They are required to submit Physical disability certificate signed by three members of Medical Authority duly constituted by the State or Central Government under Persons with Disability Act. One of the doctors in the Medical Authority shall be a specialist in the particular field pertaining to the disability. The name, degree, and specialization of all the doctors, date of issue shall be clearly visible in the certificate.

## 6.0 Admission Schedule:

For the Admission Schedule and Important dates candidates can see the website [www.ccmn.in](http://www.ccmn.in)

*Candidates are advised to regularly check website for updates.*

**### Institute reserves the right to conduct further admission rounds or drop the rounds, as per the situation. These additional rounds, if conducted, will be subject to appropriate rules.**

## 7.0 Provisions of admission

If any dispute arises by interpreting any of the above provisions, the decision of the Director, VNIT shall be final and binding on all candidates.

The above Rules are subject to modifications whenever found necessary by the Institute.

The Admission Policy & Procedures are subject to the jurisdiction of Hon'ble Court of Nagpur.

**Director,  
VNIT, Nagpur**

***Disclaimer:*** Institute is not responsible for any inadvertent error that may have crept in the soft copy of the M.Sc. admission information published on the website and reserves the right to correct/alter the information if necessary at any stage.

## Annexure I

Detail Syllabus of the following schemes is available at [www.vnit.ac.in](http://www.vnit.ac.in)

### A) Scheme for M.Sc. (Physics) : Two years (Four Semester Programme)

I Semester				II Semester			
Code	Course	L-T-P	Credits	Code	Course	L-T-P	Credits
<b>Core</b>				<b>Core</b>			
PHL511	Classical Mechanics	3-0-0	3	PHL521	Quantum Mechanics	3-0-0	3
PHL512	Electronics-1	3-0-0	3	PHL522	Electrodynamics	3-0-0	3
PHL514	Communication skill	2-0-0	Audit	PHL523	Electronics –II	3-0-0	3
PHP515	General Physics Lab	0-0-6	3	PHL524	Statistical Mechanics	3-0-0	3
MAL516	Mathematical Physics	3-0-0	3	PHL525	Thin Film Techniques	3-0-0	3
CSL501	Computer Programming	3-0-0	3	PHP526	Electronics Lab	0-0-6	3
CSP501	Computer Programming	0-0-2	1				
<b>Total No. Of Credits :</b>			<b>16</b>	<b>Total No. Of Credits :</b>			<b>18</b>
III Semester				IV Semester			
Code	Course	L-T-P	Credits	Code	Course	L-T-P	Credits
<b>Core</b>				<b>Core</b>			
PHL531	Solid State Physics	3-0-0	3	PHL 534	Nuclear and Particle physics	3-0-0	3
PHL532	Atomic and Molecular Physics	3-0-0	3	PHL 537	Nanomaterials	3-0-0	3
PHL533	Material Science	3-0-0	3	PHD 502	Project Phase - II		4
PHP533	Material Science Lab	0-0-4	2				
PHD501	Project Phase – I		3				
<b>Total No. Of Credits :</b>			<b>14</b>	<b>Total No. Of Credits :</b>			<b>10</b>
<b><u>Elective</u></b>							
MML506	Structure & Characterisation of Materials	3-0-0	3				
MMP506	Structure & Characterisation of Materials	0-0-4	2				

**Total No. Of Credits : 5**

**Complete Course Credits : 63**

## B) Scheme for M.Sc.(Chemistry) : Two years ( Four Semester Programme)

Sr. No	Semester	Subject Code	Name of the Subject	Course Category	L	T	P	Credits
1	I	CHL 511	Molecular Thermodynamic	DC	3	-	-	3
2	I	CHL512	Principle of Organic synthesis	DC	3	-	-	3
3	I	CHL513	Quantum Chemistry and Atomic Structure	DC	3	-	-	3
4	I	CHL514	Main group and Transition metal chemistry	DC	3	-	-	3
5	I	CHP526	Physical Chemistry Lab	DC	-	-	6	3
6	I	CHP516	Organic Chemistry Lab	DC	-	-	6	3
7	I	HUL605	Communication Skill	AUDIT	3	-	-	Audit
8	I	CSL 101	Computer Programming	AUDIT	3	-	-	Audit
	I	CSP 101	Computer Programming	AUDIT	-	-	2	Audit
9	II	CHL521	Electrochemistry and Dynamics of Chemical process	DC	3	-	-	3
10	II	CHL522	Stereochemistry and Organic reaction mechanism	DC	3	-	-	3
11	II	CHL523	Modern method of analysis	DC	3	-	-	3
12	II	CHL524	Organometallics and Catalysis	DC	3	-	-	3
13	II	CHP525	Analytical chemistry Lab	DC	-	-	6	3
14	II	CHP515	Inorganic Chemistry Lab	DC	-	-	6	3
15	III	CHL531	Application of Spectroscopic techniques for structure determination	DC	3	-	-	3
16	III	CHL532	Solid state and surface chemistry	DC	3	-	-	3
17	III	CHL533	Bioinorganic Chemistry	DC	3	-	-	3
18	III	CHP534	Computational Chemistry lab	DC	-	-	2	1
19	III	CHP535	Synthesis and Characterization lab	DC	-	-	6	3
20	III	CHD536	Project Phase I	DC	-	-	6	3
21	IV		Elective I	DE	3	-	-	3
22	IV		Elective II	DE	3	-	-	3
23	IV	ECL243	Introduction to Electronics and Instrumentation	DC	1	-	-	1
24		CHD560	Project Phase –II	DC	-	-	8	4
				<b>Total Credits</b>				<b>63</b>

### Elective courses:

	Course Code
Chemistry of Advanced materials	CHL 541
Chemistry and Technology Water	CHL 542
Sensors and Chemical sensors	CHL 543
Green chemistry and sustainability	CHL 544
Photochemistry and Pericyclic reaction	CHL 545
Chemistry of Heterocyclic Compounds	CHL 546
Supramolecular Chemistry	CHL 547
Biomolecules	CHL 548
Chemistry of Macromolecules	CHL 549
Photochemistry and Biophysical Spectroscopy	CHL 507

### C) Scheme for M.Sc. (Mathematics): Two years (Four Semester Programme)

I Semester				II Semester			
Code	Course	L-T-P	Cr	Code	Course	L-T-P	Cr
MAL 511	Linear Algebra	3-0-0	3	MAL521	Complex Analysis	3-0-0	3
MAL512	Real Analysis	3-0-0	3	MAL522	Topology	3-0-0	3
MAL513	Theory of Ordinary Differential Equations	3-0-0	3	MAL523	Algebra	3-0-0	3
MAL514	Discrete Mathematics	3-0-0	3	MAL524	Partial Differential Equation	3-0-0	3
CSL101	Introduction to Computer Programming	3-0-0	3	MAL525	Numerical Analysis	3-0-0	3
HUL505	Communication Skill	Audit course	0	MAL526	Numerical Computation laboratory	0-0-2	1
ELECTIVE				ELECTIVE			
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			Total				Total
			15				16
III Semester				IV Semester			
MAL531	Functional Analysis	3-0-0	3	MAL541	Measure Theory and Integration	3-0-0	3
MAL532	Operations Research	3-0-0	3	MAL542	Integral Transform and Integral Equations	3-0-0	3
MAL533	Fluid Dynamics	3-0-0	3	MAD502	Project Phase II	4-0-0	4
MAL534	Probability & Statistics	3-0-0	3				
MAD501	Project Phase I		1				
ELECTIVE (Any one)				ELECTIVE (Any Two)			
MAL535	Relativity	3-0-0	3	MAL 543	Operator Theory	3-0-0	3
MAL536	Numerical Solutions of Differential Equations	3-0-0	3	MAL 544	Finite Element Methods	3-0-0	3
MAL537	Mathematical Modelling	3-0-0	3	MAL 545	Numerical Linear Algebra	3-0-0	3
MAL538	Numerical methods for Hyperbolic problems	3-0-0	3	MAL 546	Bio Mechanics	3-0-0	3
				MAL 547	Multivariate Data Analysis	3-0-0	3
				MAL 548	Financial Mathematics	3-0-0	3
				MAL 549	Nonlinear Dynamical System	3-0-0	3
			Total				Total
			16				16