Department of Physics, IIT Delhi
Welcomes
the 2021 Entry students admitted to
M Tech Programme
in
Solid State Materials (PHM)
to this
Orientation Session
(5 Aug 2021)

Programme Coordinators: Prof. Santanu Ghosh & Prof. Sujeet Chaudhary
Outline

• About the focus of MTech (SSM) Programme
• Programme Structure
• Courses in the Current Semester
• Your Teachers for Current Semester
• Teaching, Evaluations & Grading
• Future Scope & Placement
• Cocurricular Activities at IIT Campus
About M Tech (SSM) Programme

• Basics of Material science – Electronic, Structural, Thermal & Optical properties
• Energy Materials & Devices - Solar Cells, Thermoelectric Coolers/Power Generators
• Thin Film & Vacuum Technology – Central to all Electronic Devices
• Nano Technology - Science & Applications
• Semiconductor Devices & Technology- ICs, Display Devices, etc.
• Spintronics & Multiferroics - Magnetism, Data Storage, New Device Functionalities
• Materials Characterization - Analytical Techniques to better understand the Matter
## Programme Structure

**Master of Technology in Solid State Materials**

Department of Physics

The overall credits structure

<table>
<thead>
<tr>
<th>Category</th>
<th>PC</th>
<th>PE</th>
<th>OE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits</td>
<td>39</td>
<td>9</td>
<td>3</td>
<td>51</td>
</tr>
</tbody>
</table>

1 Credit $= 1$ Lecture Hour/Week

Maximum Credit / Sem $= 15$

<table>
<thead>
<tr>
<th>Program Core (PC)</th>
<th>L – T – P T</th>
</tr>
</thead>
<tbody>
<tr>
<td>PYD801 Major Project Part-I</td>
<td>0 0 12 6</td>
</tr>
<tr>
<td>PYD802 Major Project Part-II</td>
<td>0 0 24 12</td>
</tr>
<tr>
<td>PYL701 Physical Foundations of Materials Science</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL702 Physics of Semiconductor Devices</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL703 Electronic Properties of Materials</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL704 Science and Technology of Thin Films</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL705 Nanostructured Materials</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYP701 Solid State Materials Laboratory I</td>
<td>0 0 6 3</td>
</tr>
<tr>
<td>PYP702 Solid State Materials Laboratory II</td>
<td>0 0 6 3</td>
</tr>
</tbody>
</table>

| Total Credits | 39 |

<table>
<thead>
<tr>
<th>Program Electives (PE)</th>
<th>L – T – P T</th>
</tr>
</thead>
<tbody>
<tr>
<td>PYL707 Characterization Techniques for Materials</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL723 Vacuum Science and Cryogenics</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL724 Advances in Spintronics</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL725 Surface Physics and Analysis</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL726 Semiconductor Device Technology</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL727 Energy Materials and Devices</td>
<td>3 0 0 3</td>
</tr>
<tr>
<td>PYL728 Quantum Heterostructures</td>
<td>2 0 0 2</td>
</tr>
<tr>
<td>PYL729 Nanoprobe Techniques</td>
<td>1 0 0 1</td>
</tr>
<tr>
<td>PYV759 Selected Topics in Solid State Materials</td>
<td>1 0 0 1</td>
</tr>
</tbody>
</table>

Programme Code: PHM

Lecture, Tutorials, Practicals, Total

$L$ - Lecture
$P$ - Practicals
$T$ - Project
$Y$ - Selected Topics
# Course Structure – Semester vise (PHM)

<table>
<thead>
<tr>
<th>Sem.</th>
<th>Courses</th>
<th>Contact h/week</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>I</td>
<td>PYL701</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Physical Foundations of Materials Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PYL702</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physics of Semiconductor Devices</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PYL703</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electronic Properties of Materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PYP701</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solid State Materials Laboratory-I</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PE-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3-0-0) 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>PYL704</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Science and Technology of Thin Films</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PYL705</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nanostructured Materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PYP702</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solid State Materials Laboratory-II</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PE-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3-0-0) 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PE-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3-0-0) 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td>OE-1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(3-0-0) 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PYD801</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maj. Proj. Part-I</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0-0-12) 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PYD802</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maj. Proj. Part-II + Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0-0-24) 12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total = 51**
# Your Courses in 1st Semester (2021-22)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Course Title</th>
<th>Core/Elective</th>
<th>Course Code</th>
<th>Str (L-T-P)</th>
<th>Faculty</th>
<th>Slot</th>
<th>Day/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physical Foundations of Materials Science</td>
<td>Core</td>
<td>PYL701</td>
<td>3-0-0</td>
<td>Rajendra Singh <a href="mailto:rsingh@iitd.ac.in">rsingh@iitd.ac.in</a></td>
<td>M#</td>
<td>M, Th: 17:00-18:20</td>
</tr>
<tr>
<td>2</td>
<td>Physics of Semiconductor Devices</td>
<td>Core</td>
<td>PYL702</td>
<td>3-0-0</td>
<td>Amartya Sen Gupta <a href="mailto:amartya@iitd.ac.in">amartya@iitd.ac.in</a></td>
<td>D</td>
<td>T, W, F: 09:00-10:00</td>
</tr>
<tr>
<td>3</td>
<td>Electronic Properties of Materials</td>
<td>Core</td>
<td>PYL703</td>
<td>3-0-0</td>
<td>P K Muduli <a href="mailto:muduli@iitd.ac.in">muduli@iitd.ac.in</a></td>
<td>J</td>
<td>M, T, F: 12:00-12:50</td>
</tr>
<tr>
<td>4</td>
<td>Characterization Techniques for Materials</td>
<td>Elective</td>
<td>PYL707</td>
<td>3-0-0</td>
<td>Pankaj Srivastava <a href="mailto:pankajs@iitd.ac.in">pankajs@iitd.ac.in</a></td>
<td>H</td>
<td>M, W: 11:00-11:50, Th: 12:00-12:50</td>
</tr>
<tr>
<td>5</td>
<td>Vacuum Science and Cryogenics</td>
<td>Elective</td>
<td>PYL723</td>
<td>3-0-0</td>
<td>Sujeet Chaudhary <a href="mailto:sujeetc@iitd.ac.in">sujeetc@iitd.ac.in</a></td>
<td>A#</td>
<td>M, Th: 8:00 - 9:20</td>
</tr>
<tr>
<td>6</td>
<td>*Solid State Materials Laboratory I</td>
<td>Core</td>
<td>PYP701</td>
<td>0-0-6</td>
<td>Rajendra Singh <a href="mailto:rsingh@iitd.ac.in">rsingh@iitd.ac.in</a></td>
<td>-</td>
<td>W: 13:00-13:50, T, F: 18:00-18:50</td>
</tr>
</tbody>
</table>

*Will run later when MTech students are allowed to board on campus

# Two lectures (each of 80 minutes) per week
(Physical Foundations of Materials Science, &
Solid State Materials Laboratory-1)

Rajendra Singh, Ph.D. (Jawaharlal Nehru Univ.)
Professor
Semiconductor Materials and Processing,
Wide Band Gap Semiconductor, Semiconductor
Nano-wires, Semiconductor Wafer Bonding.

(Electronic Properties of Materials)

Pranaba Kishore Muduli, Ph.D.
(Humboldt Univ. & PDI, Berlin)
Associate Professor
Spin Torque Induced Magnetization
Dynamics, Spintronics and Nanomagnetism.

Kaustuv Manna, Ph.D. (IISc)
Assistant Professor
Experimental Condensed Matter Physics
Single crystal growth of intermetallic alloys and oxides;
Magnetism; High field electrical and thermal
transport measurements
(Solid State Materials Laboratory-1)

Know Your Teachers - 1st Semester (2021-2022)

(Physics of Semiconductor Devices)

Amartya Sengupta, Ph.D. (Rutgers Univ. & NIT)
Assistant Professor
Experimental Ultrafast Optics, THz Spectroscopy,
Optical Spectroscopy at High P-T, Mineral Physics.

(Characterization Techniques for Materials)

Pankaj Srivastava, Ph.D. (Rajasthan Univ.)
Professor
Experimental Solid State Physics,
Electronic Structure of Materials,
Surface-interface Physics.

(Vacuum Science and Cryogenics)

Sujeet Chaudhary, Ph.D. (IITDelhi)
Professor
Experimental Condensed Matter Physics:
Thin Films, Magnetism, Spintronics.
(Programme Coordinator)
Know Your Teachers - 1st Semester (2021-2022)

(Nanoprobe Techniques)

B.R. Mehta, Ph.D. (IITD) (Schlumberger Chair)
Professor
Thin Film and Nanostructured Materials,
Inorganic-Organic Hybrid Interfaces, Resistive
Memory, Thermoelectric, Photo Electro Chemical
and Solar Cell Devices.

Sawanta Bhattacharya, Ph.D. (IACS, Kolkata)
Associate Professor
Computational Materials Science, Energy
Conservation, Catalysis, Graphene, Genetic
Algorithm, Machine Learning.

Santanu Ghosh, Ph.D. (Jawaharlal Nehru Univ.)
Professor
Experimental Condensed Matter Physics,
Thin Film, Ion Materials Interaction.
(Programme Coordinator)

(Energy Materials & Devices)

G.B. Reddy, Ph.D. (IIT Delhi)
Professor
Thin Film Technology, Smart Windows,
Nano-Structured Films.

Pintu Das, Ph.D. (Uni. of Saarland, Germany)
Associate Professor
Experimental Condensed Matter Physics:
Magnetism at Nanometer Scale, Charge Carrier-
dynamics (Low-frequency) as well as Atomic/
Nanometer Scale Electronic Phenomena in
Correlated Electron Systems, Instrumentation.

(Major Project – Part-I)
Know Your Teachers (Associated with Solid State Materials)

J.P. Singh, Ph.D. (Jawaharlal Nehru Univ.)
Professor

R. Chatterjee, Ph.D. (IIT Kanpur)
Professor

Sujit Manna, Ph.D. (IACS, Kolkatta)
Assistant Professor
Experimental Condensed Matter Physics, Quantum Materials, Unconventional Super-conductivity, MBE, Spectroscopic Imaging (STM/STS).

Neeraj Khare, Ph.D. (BHU)
Professor

Rajendra S. Dhaka, Ph.D. (UGC-DAE CSR, Indore)
Associate Professor

Brajesh Kumar Mani, Ph.D. (PRL, Ahmedabad)
Assistant Professor
Computational Condensed Matter Physics, Computational Many-Body Physics, Molecular Dynamics and Monte Carlo Simulations.

(Head of Dept.)
(Head of Nanoscale Research Facilities)
(PhD. Programme Coordinator)
(Dept. Faculty coordinating with Office of Carrier Services)
Teaching, Evaluation & Grading

- **Teaching** will be **online** at the moment
  - via Microsoft TEAMS
  - webs-site links to join the lecture class will be sent by respective course instructors
  - teaching tools *Moodle, Imparctus*, etc.  ([https://moodle.iitd.ac.in/login/index.php](https://moodle.iitd.ac.in/login/index.php))

  *(Note: Access to above and also to several other web-resources e.g., library, etc., will be via **INTRANET**. To have remote access to **INTRANET** ([https://internal.iitd.ernet.in](https://internal.iitd.ernet.in)), you need to setup **VPN (Virtual Private Network)** in your laptop. For setting up and installations of **VPN**; visit **CSC website** for details of installation ([http://www.cc.iitd.ernet.in/CSC](http://www.cc.iitd.ernet.in/CSC))*

- **Evaluation** – Usually, 2 mid-sem Exams (**MINORS**) and 1 end-sem Exam (**MAJOR**) (Includes assignments, quizzes, etc.). **But this semester, you have only 1 Minor & 1 Major**

- **Grading** – **Valid pass grades** (*A, A-, B, B-, C, C- & D*; need to secure >30% marks)
  - If earned marks are less than 20-25%, **Fail-grade** (**F**) is awarded;
  - For 25%-29% marks, **E-grade** is awarded (**ReMajor** at the start of next sem)
E-Academic Portal

https://eacademics.iitd.ac.in/sportal/login
Important

• For formalities related to registration, Form-A, medical booklet, bank account, Institute email IDs, password, etc., please contact
  Dr. Atul Vyas, Joint Registrar | Ph. 011-26591743
  (E-mail: drpgsr@admin.iitd.ac.in)

• For account/fellowship related queries, you may contact
  Mr. Shamim, Deputy Registrar (Accounts) | 011-26597159 (F/Ship, Mr. HVK Chopra)
  (E-mail: draccounts@admin.iitd.ac.in)  a25904@admin.iitd.ac.in

• Last date of uploading the documents and certificates of educational qualifications, etc. is 16th August, 2021

• Last date to submit the proof of passing the minimum educational qualifying examination is 31st October, 2021
DAAD Fellowship
(to perform the thesis project in Germany)

• Awarded to **one** student from **each** of the MTech batches of Dept. (Total = 3)

• She/he will be doing the Thesis Project in 3\textsuperscript{rd} & 4\textsuperscript{th} Sem in the Institutes/Universities identified under DAAD exchange programme

• The student has to choose a mentor Professor (@ IITD) and host Professor (in **Germany**) who would agree *a-priori* to supervise the students project in her/his lab there
Future Scope & Placements

- **Higher studies (PhD)**

- **Academics:**
  - Teaching - Faculty at different Universities/Colleges/Institutes
  - Research & Development - Scientists at DAE/DRDO/ISRO/CSIR, IUAC, etc.

- **Industry/Entrepreneurship/Start-up:**
  - Applied Materials, Intel, Sandisk, Videocon, Samsung, Moser Baer, Global Foundries/Process Industries, etc.

### Placement Data (last 3 years)

<table>
<thead>
<tr>
<th>Year</th>
<th>B Tech (Engg. Phys.)</th>
<th>M Sc (Phys.)</th>
<th>M Tech (PHA)</th>
<th>M Tech (PHM)</th>
<th>M Tech (JOP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017-18</td>
<td>24/26</td>
<td>0/4</td>
<td>0/1</td>
<td>2/2</td>
<td>7/7</td>
</tr>
<tr>
<td>2018-19</td>
<td>28/31</td>
<td>0/3</td>
<td>1/2</td>
<td>0/4</td>
<td>9/11</td>
</tr>
<tr>
<td>2019-20</td>
<td>0/4</td>
<td>0/4</td>
<td>0/12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: [OCS @ IITD](Office of Carrier Services)
Some details of 2018-19 & 2019-20 pass-out batches

2019-20 PHM Batch (as on 5 Aug 2021):

Total Students: **12**
- 7 chose to pursue higher studies, PhD
- Others awaiting admission confirmation/ interviews via OCS@IIT Delhi

- **RWTH Aachen University, Germany** - 01
- **Nanyang Tech. Univ. Singapore** - 01
- **Sungkyunkwan Univ., Seoul South Korea** - 01
- **IIT Delhi** - 03
- **IIT Roorkee** - 01

2018-19 PHM Batch (as on Aug 2020):

Total Students: **19**
- 8 chose to pursue higher studies, PhD (Abroad)
- 9 joined PhD (India)
- 1 student has setup his own start-up (JEE Mains & Advance Coaching Centre)
- 1 student chose to prepare for Civil Service

- **RWTH Aachen University, Germany** - 01
- **Nanyang Tech. Univ. Singapore** - 01
- **Sungkyunkwan Univ., Seoul South Korea** - 01
- **IIT Delhi** - 03
- **IIT Roorkee** - 01
- **RWTH Aachen University, Germany**
- **Univ. of Groningen, Netherland**
- **Polish Academy of Science, Poland**
- **Seoul National University, South Korea**
- **Karlsruhe Institute of Technology, Germany**
- **Univ. of Queensland-IIT Delhi Academy of Research**
- **National Physical Laboratory, Delhi**
- **School of Interdisciplinary Research (SIRe), IIT Delhi**
Student-Teacher Interaction

The Institute encourages students to come in close contact with teacher

STUDENT TEACHER INTERACTION COMMITTEE (STIC)

STIC encourages healthy and informal interaction of students with their teachers outside the boundaries of classrooms environment. Teacher can take their students to trip, for get-together and can have informal interaction. Dinners are organized in the hostel every semester where students can invite their teachers in their hostels. STIC also organizes dinners exclusively for all freshers with their teachers who were teaching in 1st semester of academic year and also with their teachers of the department. Departmental professional societies are encouraged to organize informal activities in their departments and STIC partially supports monetarily.

CLASS COMMITTEES

In order to bring about greater contact between students and teachers, Class Committees are constituted, comprising of both, students and faculty. These committees discuss academic matters relating to the course or class concerned.

PROGRAMME COORDINATORS

The administration of all postgraduate programmes is facilitated by a faculty member designated as the Programme Coordinator. Programme Coordinator helps students regarding all registration and course related matters.
Cocurricular Activities at IIT Campus
Board for Recreational and Creative Activities (BRCA)

- Beat your stress and indulge in various recreational and creative activities
- BRCA gives a platform to nurture and showcase one's talent in co-curricular hobbies

- Dance Club
- Dramatics Club
- Debating Club
- Literary Club
- Hindi Samiti
- Quizzing Club
- Photography and Films Club
- Fine Arts and Crafts Club
- Music Club
- SPIC MACAY
- Wellness Club

The Showstopper is Rendezvous, IIT's annual cultural fest which host variety of events - pronates, choreography, dance, music and competitions on a national level
Board for Sports Activities (BSA)

Responsible for the coordination of the various sports activities in the Institute

• Cricket field with 4 turf wickets, 4 flood-lit cricket practice pitches
• Flood-lit hockey and football grounds
• 3 flood-lit volleyball and 2 Basketball courts, 8 flood-lit tennis courts
• 2 Squash courts, 1 badminton hall, 2 table tennis halls, 1 weight-lifting hall
• Olympic size swimming pool
• 2 multi-gyms, a flood-lit stadium with 400 meters athletics track
• Flood-lit jogging track
• A team of Sports Officer, Physical training instructors (PTI), part-time coaches and ground staff helps student

Friendly matches with the local colleges, inter-hostel events, the annual IIT Delhi Inter-Collegiate event ‘Sportech’, the annual Inter-IIT Sports Meet and in sporting activities organized by Institutes outside Delhi
Board for Students Publications (BSP)

Electronic and print media body of the college, run entirely by students

- "Inception"
- "Muse"
- "Elemental",
- "Impulse"
- "Inquirer"

- Annual literary festival, "Literati" which is recognized and appreciated as one of the best literary college festivals in North India
Board for Students Welfare (BSW)

Set up with an intention to look after the Welfare of the Student Community

- Smooth induction of the **Orientation process**, setting up of various camps such as cycle camp, book camp etc.,

- **Mentorship** of Fresh students, Alumni Mentorship, Academic Mentorship, Language Mentorship, etc.

- **Student Counselling Service (SCS)**

- **Student Cooperation Society (SCOOPS)** which runs on a no-profit-no-loss philosophy. Its provide students access to buy good-quality subsidised stationary items, notebooks and related services.

- **Socio-welfare fest** of IIT Delhi, Speranza. Each year Speranza welcomes a huge crowd of students with great enthusiasm (Talk shows, workshops, fun games and competitive events)
National Service Scheme (NSS)
Social consciousness of the youth with an overall objective of personality development of students through community service

National Cadet Corps (NCC)
Development of leadership, character, comradeship, spirit of sportsmanship and the ideal of service

Departmental Professional Societies
Managed by the faculty and students to promote academic and professional interests

Student Counselling Service (SCS)
Assisting students in sorting out their difficulties and dilemmas in an environment where they can talk freely in confidence about any matter which is troubling them

Medical Facilities
Thank you!

&

Stay Safe and Happy Learning!