Department of Electronics and Electrical Engineering

RF and Photonics

Telecomm

Biomedical

Integrated Optoelectronics

Automated Vehicle

Antenna

THz Metamaterials

Non-destructive testing

High-Power µ-wave

Defence

Space

Fibre Optics

Plasmonic Metamaterials

Image Courtesy: www.google.com
Radio-frequency (RF) engineering deals in devices that are designed to operate within the range of about 3 kHz up to 300 GHz. RF engineering finds applications into all systems that transmit or receives radio waves, (eg. mobile phones, radar, Wi-Fi, just to name a few).

Photonics engineering deals in light generation, manipulation, waveguiding and detection (even down to nanoscale) in optical and NIR regime. It also includes optical signal processing, switching, amplification, and sensing.

RF photonics: The availability of wideband photonic devices (sources, modulators, and detectors) essentially extend the frequency and bandwidths of typical RF systems. This allows the student to learn to amalgamate RF and photonics systems in order to leverage some of key advantages over the conventional communication transmission mediums such as reduced size and weight, low cost, improved immunity to electromagnetic interference and high data transfer capacity.

RF and Photonics group offers academic training and research expertise in the following fields:

- Antenna Design
- Microwave Passive and Active Circuit Design
- RFIC Design
- Computational Electromagnetics
- Optoelectronic Devices
- Photonics Integrated Circuits
- CMOS compatible photonics
- Nanophotonics, Plasmonics, and Metamaterial
- Optical Metrology
- Optical Sensors
- Silicon Photonics
- Engineering Optics
RF and Photonics Group Members

Prof. Anup K. Gogoi
Prof. Ratnajit Bhattacharjee
Prof. K. Rakhesh Singh
Dr. Ramesh K. Sonkar
Dr. Deabrata Sikdar
Dr. Rishikesh D. Kulkarni
Dr. Mahima Arrawatia
Prof. Ratnajit Bhattacharjee  
Ph.D Jadavpur University  
Email: ratnajit@iitg.ernet.in

More details are available on  
http://www.iitg.ernet.in/engfac/ratnajit/

Research Areas
- Microwave Engineering  
- Microstrip Antennas  
- Electromagnetics  
- Wireless Communication

Design of High Power Coaxial Magnetron in X-Band

Modelling of Terahertz Generation

Wideband Matched Feed Design for Offset Reflector

Design and Analysis of Power Dividers
Prof. Kshetrimayum Rakhesh Singh  
Ph.D NTU Singapore  
Email : krs@iitg.ernet.in

More details are available on  
http://www.iitg.ac.in/engfac/krs/public_html/index.html

**Research Areas**
- Synthesis and design of passive microstrip circuits/devices
- Analysis and design of printed antennas/arrays
- Spatial modulation based MIMO/Optical wireless communications
Research Areas

- Optoelectronics Devices
- III-V Compound Semiconductors
- Photonics Integrated Circuits
- Integrated Optics, Sensors
- Fiber Optics Communication
- Silicon Photonics

Dr. Ramesh Kumar Sonkar
Ph.D IIT Kanpur
Email: sonkar@iitg.ernet.in

More details are available on http://www.iitg.ac.in/eee/sonkar.html#sonkarStart
Dr. Debabrata Sikdar  
PhD, Monash University (Australia)  
Postdoc, Imperial College London  
Email: deb.sikdar@iitg.ernet.in

Research Areas
- Plasmonics and Metamaterials
- Optical and THz metadevices
- Light-matter interaction at nanoscale
- Tunable nano-optical Devices
- Nanoantennas, Switches, Filters, Sensors
- Dynamic tuning in plasmonic metadevices
- Alternative Plasmonic Materials
- CMOS-compatible Plasmonics

More details are available on  
http://www.iitg.ac.in/eee/deb_sikdar.html
Research Interests

- **Optical Interferometric measurement techniques**
  - Digital Holography
  - Electronic Speckle Pattern Interferometry
  - Moiré interferometry
  - Shearography
  - Quantitative phase imaging

- **Optical Non-interferometric measurement techniques**
  - Digital Image Correlation
  - Transport of Intensity based phase measurement
  - Fringe Projection Profilometry for 3D shape measurement

- **Optical signal processing for the extraction of phase and its derivatives**

- **Application of interferometric signal processing techniques in non-optical measurement techniques**
  - Interferometric Synthetic Aperture Radar
  - Magnetic Resonance Imaging

More details are available on [http://www.iitg.ac.in/eee/rishikesh.html](http://www.iitg.ac.in/eee/rishikesh.html)
Research Areas
- Energy Harvesting
- Antennas
- RFIC Design
- MMIC Design
- Power Amplifier Design for 5G Applications
- Antenna and Beam forming networks for 5G
- Wake Receiver Design

More details are available on http://www.iitg.ac.in/eee/mahima.html
# Course Structure: MTech

## Semester I

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>L-T-P</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EE 540</td>
<td>Advance Electromagnetic Theory &amp; Antennas</td>
<td>3-0-0</td>
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<tr>
<td>EE 541</td>
<td>RF Circuits and Systems</td>
<td>3-0-0</td>
<td>6</td>
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<tr>
<td>EE 542</td>
<td>Fiber Optic System</td>
<td>3-0-0</td>
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<td>EE 543</td>
<td>Optical Systems Laboratory</td>
<td>0-0-3</td>
<td>3</td>
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## Semester II

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<td>Photonics Devices and Circuits</td>
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<td>EE 545</td>
<td>Computational Electromagnetics</td>
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<td>EE 546</td>
<td>Optical Networks</td>
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<td>Antennas, RF and Microwave Laboratory</td>
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<td>EE/PH 6xx</td>
<td>Elective III</td>
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## Semester III

<table>
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<tbody>
<tr>
<td>EE 698</td>
<td>Project Phase-I</td>
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## Semester IV

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<td>Project Phase II</td>
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List of Departmental Electives can be found here: [http://www.iitg.ac.in/eee/electives.html](http://www.iitg.ac.in/eee/electives.html)
### Course Structure: MS + PhD

**Semester - I**
At least Four Courses with a minimum aggregate of 24 credits among EE 5xx / EE 6xx / XX 5xx / XX 6xx courses.

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Name/Type</th>
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<th>T</th>
<th>P</th>
<th>C</th>
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</thead>
<tbody>
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<td>EE 5xx / EE 6xx</td>
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<tr>
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<tr>
<td>XX 5xx / XX 6xx</td>
<td>Elective - 3</td>
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<td>0</td>
<td>0</td>
<td>6</td>
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<tr>
<td>XX 5xx / XX 6xx</td>
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<td>12</td>
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<td>24</td>
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</table>

**Semester - II**
At least Four Courses with a minimum aggregate of 24 credits among EE 5xx / EE 6xx / XX 5xx / XX 6xx courses.

<table>
<thead>
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<th>Course No.</th>
<th>Course Name/Type</th>
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<th>P</th>
<th>C</th>
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</tr>
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<td>Elective - 6</td>
<td>3</td>
<td>0</td>
<td>0</td>
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</tr>
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<td>Elective - 7</td>
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<td>Elective - 8</td>
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**Semester - III**
At least Four Courses with a minimum aggregate of 24 credits among EE 5xx / EE 6xx / XX 5xx / XX 6xx courses.

<table>
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<tr>
<th>Course No.</th>
<th>Course Name/Type</th>
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<th>C</th>
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<tbody>
<tr>
<td>EE 5xx / EE 6xx</td>
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<tr>
<td>EE 5xx / EE 6xx</td>
<td>Elective - 6</td>
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<tr>
<td>XX 5xx / XX 6xx</td>
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<td>Elective - 8</td>
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<td>12</td>
<td>0</td>
<td>0</td>
<td>24</td>
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</tbody>
</table>

**Note:** PhD students who have an MTech from IITs can be exempted from course work.

### Course Structure: PhD

**Semester - I**
At least Four Courses with a minimum aggregate of 24 credits among EE 5xx / EE 6xx / XX 5xx / XX 6xx courses.

<table>
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<tr>
<th>Course No.</th>
<th>Course Name/Type</th>
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<th>T</th>
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<th>C</th>
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<tbody>
<tr>
<td>EE 5xx / EE 6xx</td>
<td>Elective - 1</td>
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<td>EE 5xx / EE 6xx</td>
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<tr>
<td>XX 5xx / XX 6xx</td>
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<tr>
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<td>0</td>
<td>24</td>
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</tbody>
</table>

**Note:** PhD students who have an MTech from IITs can be exempted from course work.

### List of Courses:
1. All EE 5xx courses of the MTech program of the Dept of EEE.
2. All EE 6xx elective courses offered from the Dept of EEE.
3. All XX 5xx / XX 6xx courses offered from the other departments of the institute.
Who can apply for RF & Photonics programmes

- GATE qualified candidates (EC, EE, PH*)
- IIT Graduates with BTech Degree (ECE, EE, EP or equivalent) can apply without GATE score for MTech
- Graduates with BTech Degree (ECE, EE, EP or equivalent) from Centrally Funded Technical Institutes such as IITs, NITs, IIITs etc. can apply without GATE score for PhD
- QIP Candidates
- Defence Sponsored Candidates
- Part time Candidates

* Subjected to approval by the committee. Please check the website for latest updates.

How to Apply:
Instructions are available on the IIT Guwahati website.
http://www.iitg.ac.in/acad/
Career Options

- Academia
- R&D Jobs in Industries
Looking forward to welcoming you at IITG