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## **687 PHYSICS OF MATERIALS**



### **PHYS 687 - PHYSICS OF MATERIALS**

#### **Section #**

102

**Instructor:** N.M. Ravindra – Ravi

**Lab:** Tiernan – 414

**Office Hours:** Generally Open Door – unless away at a Meeting; preferably in the afternoons – 3 to 5 pm

**Contact Information:** As above

#### **Physics 687 – Physics of Materials (3 credits)**

Fundamentals of quantum mechanics; energy bands in crystals; electrical conduction in metals and alloys, semiconductors; optical properties of materials; quantum mechanical treatment of optical properties; magnetic properties of materials; thermal properties, heat capacity, and thermal expansion in solids.

#### **Course Outline**

**Pre-Requisites** – Some knowledge of Mathematics and Solid State Physics at the Graduate Level will be beneficial; Phys 441 or equivalent (see undergraduate catalog for description).

**Learning Goal** - Exposure to research-based inquiry.

**Learning Outcomes** – Acquire sufficient breadth of knowledge in Materials to be able to acquire new skills and problem solving approaches that allow continuous learning, development and training.

**Preferred Reference Book –**

Electronic Properties of Materials, Rolf E. Hummel, Springer;

Materials Chemistry, Fahlman, Bradley D ISBN- 978-94-007-0692-7

Reference Literature from Public Domain; Research Publications; Google Scholar, Research Gate

<b>Week</b>	<b>Chapter</b>
One	Introduction to Fundamentals of Electron Theory
Two	Introduction, Wave Particle Duality,
Three	Schrödinger Equation
Four	Solution of Schrödinger Equation
Five	Energy Bands in Crystals
Six	Electrons in a Crystal
Seven	Mid-Term Exams; Electrical Properties of Materials – Metals and Alloys
Eight	Semiconductors, Insulators, Polymers, Ceramics and Amorphous Materials
Nine	Fundamentals of Optical Properties
Ten	Applications of Optical Properties
Eleven	Magnetic Properties of Materials
Twelve	Applications of Magnetic Properties
Thirteen	Thermal Properties of Materials
Fourteen	Final Exams

**Policy on Grading – Quiz (2 – 10% each); Mid-Term & Final Exam (40% each)**

**Office Hours – Generally available from 3 to 5 pm every day during the week (except Mondays).**

**Midterm Exams – February 27<sup>th</sup> 2017.**

**Final Exams – May 8<sup>th</sup> 2017.**

<https://www5.njit.edu/registrar/calendars/2017Spring.php>

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January	23	Monday	Last Day to Add/Drop Classes
January	23	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	24	Tuesday	W Grades Posted for Course Withdrawals
January	30	Monday	Last Day for 90% Refund of Tuition (no refund for fees), Full or Partial Withdrawal - no refund for partial withdrawal after this date
February	13	Monday	Last Day for 50% Refund of Tuition (no refund for fees), Full Withdrawal
March	6	Monday	Last day for 25% Refund of Tuition (no refund for fees), Full Withdrawal
March	12	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March	19	Sunday	Spring Recess Ends
March	27	Monday	Last day to Withdraw
April	14	Friday	Good Friday - No Classes Scheduled - University Closed
May	5	Friday	Final Exams Begin
May	11	Thursday	Final Exams End
May	16	Tuesday	Final Grades Due

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