Course No. : PHY210a (Modular)

Course title: Thermal Physics

Pre-requisite(s):

Credits: 3-1-0-0-[6]

Semester: Even

Department/IDP: Physics

Instructor(s): A. Dutta

Course contents:


Recommended books:

H. B. Callen, Thermodynamics and an introduction to Thermostatics (Wiley)


F. Reif, Fundamental of Statistical and Thermal Physics (Levant Books)

D. Chowdhury and D. Stauffer, Principles of equilibrium statistical Mechanics (Wiley)

Estimated student enrolment: 50
Departments to which the proposed course will be of interest: MSE, ME, AE, CHE

Other faculty members interested in teaching the proposed course: D. Chowdhury, S. Mukherjee, V. Subrahmanyam, Anjan K. Gupta, Krishnacharya

Any other remarks: This is a compulsory (modular) course for the Physics (BS) students.

Dated:_________________ Proposer: A. Dutta

Dated:_________________ DUGC Convener:_________________

The course is approved / not approved

Chairman, SUGC

Dated:__________________________
Course No. : PHY224

Course title: Optics

Pre-requisite(s):

Credits: 2-0-0-2-[12]

Semester: Odd

Department/IDP: Physics

Instructor(s): R. Vijaya

Course contents:

Review of Maxwell’s equations, Wave equation, Fresnel’s equations, States of polarization and index ellipsoid, Two- and multiple- beam interference, Michelson interferometer, Fabry-Pérot interferometer, Multilayer thin films for anti- and high-reflection, Fraunhofer diffraction and diffraction grating, Coherence properties of light.

List of experiments:

1. Preparation lab –I, II
2. Verification of Fresnel’s equations
3. General polarimetry
4. Birefringence
5. 2-slit and N-slit interference
6. Michelson interferometer
7. Fabry-Perot interferometer
8. Diffraction - single-slit, wire and Babinet principle
9. Diffraction grating
10. Spatial / temporal coherence
11. Individual appreciation experiment in Optics (One experiment to be designed and performed by each student anytime during the semester (eg: holography, spectroscopy, wedge plate, Fresnel lens (zone plate), Arago spot, fiber optics etc.)

Recommended books:

M. Born and E. Wolf, *Principles of Optics* (Cambridge Univ Press)

J. B. Peatross and M. Ware, *Physics of Light and Optics*

A. Ghatak, *Optics* (Tata McGraw-Hill)

E. Hecht, *Optics* (Addison-Wesley)


Estimated student enrolment: 30

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: S. A. Ramakrishnan, H. Wanare, A. Pradhan, R. Gupta

Any other remarks: This is a compulsory course for the Physics (BS) students.

Dated: _______________ Proposer: R. Vijaya

Dated: _______________ DUGC Convener: ________________

The course is approved / not approved

**Chairman, SUGC**

Dated: ___________________________
Indian Institute of Technology, Kanpur
Proposal for a New Course

Course No. : PHY226b (Modular)

Course title:  Relativity

Pre-requisite(s):

Credits: 3-1-0-0-[6]

Semester: Even

Department/IDP: Physics

Instructor(s):  T. Sarkar

Course contents:

Special Relativity, Empirical evidence for the constancy of c, Frames of reference, Lorentz transformations, Relativity of simultaneity, Twin and other paradoxes, Space-time diagrams Transformation laws for velocity, Momentum, energy, mass-energy equivalence, 4-vectors, Force equations, Kinematics of decays and collisions Maxwell’s equations in covariant form.

Recommended books:

R. Resnick, *Introduction to Special Relativity* (Wiley)


Estimated student enrolment: 50

Departments to which the proposed course will be of interest: MSE, ME, AE, CHE

Other faculty members interested in teaching the proposed course: D. Chowdhury, D. Sahdev, H. C. Verma, Krishnacharya

Any other remarks: This is a compulsory (modular) course for the Physics (BS) students.
Dated:_______________ Proposer: T. Sarkar

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Course No.: PHY315

Course title: Modern Physics Lab

Pre-requisite(s):

Credits: 1-0-0-2-[7]

Semester: Odd

Department/IDP: Physics

Instructor(s): A. K. Gupta

Course contents:

The experiments determine some of the fundamental constants (Planck constant, e/m of electron, gravitational constant, Rydberg constant, Boltzmann constant) or quantitatively demonstrate some of the concepts (quantum analog, Single photon interference) and applications (Thermionic emission, Solar Cells) of quantum physics. Also there are experiments that illustrate applications of thermodynamics (Johnson Noise, thermoelectric effect and Peltier effect), and non-linear dynamics (chaos). The lectures consist of introduction to error analysis and essential tools of modern experiments (vacuum and low temperatures), discussion of experiments leading to quantum mechanics and a brief introduction to other experiments carried out in the lab.

Recommended books:


D.W. Preston, *Experiments in Physics* (Wiley)

Resource Files on Experiments maintained in the Laboratory

P. R. Bevington, *Data Reduction and Error Analysis for Physical Sciences* (McGraw Hill)

Estimated student enrolment: 30

Departments to which the proposed course will be of interest:
Other faculty members interested in teaching the proposed course: K. P. Rajeev, R. Gupta, S. Banerjee, Krishnacharya

Any other remarks: This is a compulsory course for the Physics (BS) students.

Dated:_______________ Proposer: A. K. Gupta

Dated:_______________ DUGC Convener:__________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Indian Institute of Technology, Kanpur
Proposal for a New Course

Course No.: PHY401
Course title: Classical Mechanics
Pre-requisite(s):
Credits: 3-1-0-0-[11]
Semester: Odd
Department/IDP: Physics
Instructor(s): M. K. Verma

Course contents:

Recommended books:
L. D. Landau and E. M. Lisfsitz, Mechanics, Courses of Theoretical Physics (Pergamon)
H. Goldstein, C. P. Poole, and J. L. Safko, Classical Mechanics (Addison Wesley)
H. C. Corben and P. Stehle, Classical Mechanics (Dover)
T. W. B. Kibble, Classical Mechanics (Addison Wesley)
H. Strogatz, Nonlinear Dynamics and Chaos (Levant, Indian Ed.)

Software packages for chaos, Java for chaos: free for all platforms
Estimated student enrolment: 100

Departments to which the proposed course will be of interest: AE, ME

Other faculty members interested in teaching the proposed course: M. K. Harbola, H. C. Verma, A. Dutta, T. Sarkar

Any other remarks: This is a compulsory course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:__________________ Proposer: M. K. Verma

Dated:__________________ DUGC Convener:__________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Course No. : PHY412

Course title: Statistical Mechanics

Pre-requisite(s):

Credits: 3-1-0-0-[11]

Semester: Even

Department/IDP: Physics

Instructor(s): V. Subrahmanyan

Course contents:


Recommended books:

F. Reif, Fundamentals of Statistical and Thermal Physics (Levant Books)

K. Huang, Statistical Mechanics (Wiley)

R. K. Pathria, Statistical Mechanics (Elsevier India Pvt. Ltd.)

L. D. Landau and E. M. Lisfsitz, Statistical Physics (Butterworth-Heinemann)

S. K. Ma, Statistical Mechanics (World Scientific Publishing Company)

D. Chowdhury and D. Stauffer, Principles of Equilibrium Statistical Mechanics (Wiley)

Estimated student enrolment: 100
Departments to which the proposed course will be of interest: MSE, CHE, CHM

Other faculty members interested in teaching the proposed course: D. Chowdhury, A. Dutta, S. Mukherjee

Any other remarks: This is a compulsory course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: V. Subrahmanyam

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Course No.: PHY421

Course title: Mathematical Methods I

Pre-requisite(s):

Credits: 3-1-0-0-[11]

Semester: Odd

Department/IDP: Physics

Instructor(s): T. Sarkar

Course contents:


Recommended books:


Estimated student enrolment: 100

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: T. K. Ghosh, K. Bhattacharya, S. Mukherjee
Any other remarks: This is a compulsory course for the Physics (BS) students.
Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: T. Sarkar

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Course No.: PHY431

Course title: Quantum Mechanics

Pre-requisite(s):

Credits: 3-1-0-0-[11]

Semester: Odd

Department/IDP: Physics

Instructor(s): A. Singh

Course contents:


Recommended books:

J. L. Powell and B. Crasemann, *Quantum Mechanics* (Narosa)


E. Merzbacher, *Quantum Mechanics* (Wiley)

S. Gasiorowicz, *Quantum Physics* (Wiley)

L. I. Schiff, *Quantum Mechanics* (Tata McGraw-Hill)

J. J. Sakurai, *Modern Quantum Mechanics* (Pearson)

L. D. Landau and E. M. Lifshitz, *Quantum Mechanics* (Elsevier)

C. Cohen-Tannoudji, *Quantum Mechanics* (Wiley)

D. J. Griffiths, *Introduction to Quantum Mechanics* (Pearson)

Estimated student enrolment: 100
Departments to which the proposed course will be of interest: EE, MSE, CSE, CHM

Other faculty members interested in teaching the proposed course: K. Bhattacharya, D. Chakrabarti, A. Agrawal, T. K. Ghosh, Krishnacharya

Any other remarks: This is a compulsory course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated: ________________ Proposer: A. Singh

Dated: ________________ DUGC Convener: ________________

The course is approved / not approved

Chairman, SUGC

Dated: ___________________________
Course No.: PHY461
Course title: Experimental Physics I
Pre-requisite(s):
Credits: 0-0-0-2-[8]
Semester: Both
Department/IDP: Physics
Instructor(s): Y. N. Mohapatra
Course contents:
The laboratory will provide experimental set-up for more than approximately 40 different experiments (condensed matter physics, optical techniques, nuclear physics) of which at least six are compulsory for a student to complete. The list of experiments are provided in the regularly updated Laboratory Manual maintained by the Department of Physics. The experiments will be a judicious mix involving different techniques and specialties.

Recommended books:
Resource Files on Experiments maintained in the Laboratory.
P. R. Bevington, *Data Reduction and Error Analysis for Physical Sciences* (McGraw Hill)

Estimated student enrolment: 80

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: Z. Hossain, A. Pradhan, R. Gupta, S. Banerjee, Krishnacharya
Any other remarks: This is a compulsory course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: Y. N. Mohapatra

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Indian Institute of Technology, Kanpur
Proposal for a New Course

Course No.: PHY473

Course title: Computational Methods and Numerical Analysis

Pre-requisite(s):

Credits: 2-0-0-1-[8] (Lab is of two-hour duration)

Semester: Odd

Department/IDP: Physics

Instructor(s): S. A. Ramakrishnan

Course contents:


Recommended books:

A. Ralston and P. Rabinowitz, *First course on numerical analysis* (McGraw Hill)


Estimated student enrolment: 80

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: S. Bhattacharjee, M. K. Verma, D. Chakrabarti, R. Prasad, M. K. Harbola

Any other remarks: This is a compulsory course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: S. A. Ramakrishnan

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Course No.: PHY552

Course title: Classical Electrodynamics I

Pre-requisite(s):

Credits: 3-1-0-0-[11]

Semester: Odd

Department/IDP: Physics

Instructor(s): P. Jain

Course contents:

Electrostatics, Laplace and Poisson equations and their solutions, Uniqueness theorem, Multipole expansion
Magnetostatics: Boundary-value problems involving dielectrics and magnetic materials, Maxwell's equations, Electromagnetic waves in medium, Poynting's theorem, Momentum and angular momentum of electromagnetic fields, Electromagnetic radiation, Retarded potentials, Lorentz and Coulomb gauge (relativistic transformation of electric and magnetic fields)

Recommended books:


D. J. Griffiths, *Introduction to Electrodynamics* (PHI Learning)

J. D. Jackson, *Classical Electrodynamics* (Wiley)

Estimated student enrolment: 100

Departments to which the proposed course will be of interest: EE

Other faculty members interested in teaching the proposed course: M. K. Harbola, R. Vijaya, S. Bhattacharjee

Any other remarks:

This is a compulsory course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.
Dated: _______________ Proposer: P. Jain

Dated: _______________ DUGC Convener: ________________

The course is approved / not approved

Chairman, SUGC

Dated: __________________________
Course No.: PHY555, PHY556, PHY557, PHY558

Course title: BS Projects

Pre-requisite(s):

Credits: 3-1-0-0-[09]

9 credit for each of the course.

Semester: Both

Department/IDP: Physics

Instructor(s): A. Singh

Course contents:

Student has to carry out work on a well formulated and open-ended problem with physics content to serve as initiation to research. The projects can be experimental, theoretical, computational, or a suitable combination thereof.

Recommended books:

Estimated student enrolment: 10

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: Any faculty member of the department can float a project appropriate to for a BS students.

Any other remarks: This is an elective course for the Physics (BS) students.

Dated: _______________ Proposer: A. Singh

Dated: _______________ DUGC Convener: ________________
The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Course No.: PHY206

Course title: Order and Chaos

Pre-requisite(s):

Credits: 3-0-0-0-[9]

Semester: Even

Department[IDP]: Physics

Instructor(s): M. K. Verma

Course contents:

Dynamical systems, Importance of nonlinearity, Nonlinear dynamics of flows (in 1, 2 and 3 dimensions) and maps (in 1, 2 dimensions) in phase space (equilibrium, periodicity, bifurcation, catastrophe, deterministic chaos, strange attractor), Routes to chaos (period doubling, quasiperiodicity/intermittency, universality, renormalization), Measurement of chaos (Poincaré section, Lyapunov index, entropy), Fractal geometry and fractal dimension, Examples from physical sciences, engineering and biology.

Recommended books:

H. Strogatz, *Nonlinear Dynamics and Chaos* (Levant Books)


Estimated student enrolment: 100

Departments to which the proposed course will be of interest: ME, AE

Other faculty members interested in teaching the proposed course: S. Chakraborty, P. Wahi (ME), S. Das (ME), K. Srihari (CHM)

Any other remarks: This is an elective course for the Physics (BS) students. This course is an open elective for students of the other departments.
Dated: __________       Proposer:

M. K. Verma

Dated: __________       DUGC Convener: ________________

The course is approved / not approved

Chairman, SUGC

Dated: ________________


Indian Institute of Technology, Kanpur
Proposal for a New Course

Course No.: PHY407
Course title: General Relativity
Pre-requisite(s): PHY226b or equivalent
Credits: 3-0-0-0-[9]
Semester: Odd
Department/IDP: Physics
Instructor(s): T. Sarkar

Course contents:
Review of Special Relativity, Representations of the Lorentz group and SL(2,C), 4-vectors & 4-tensors, Introduction to General Relativity, Principle of Equivalence, Mach’s principle, Riemannian geometry, Metric tensors, Christoffel symbols, Covariant differentiation, The curvature and stress-energy tensors, Conservation laws in curved space-time, The gravitational field equations, Geodesics and particle trajectories, The Schwarzschild solution, Black hole & horizon, The classic experimental tests of GR, Basic cosmology, FRW metric, Cosmological expansion, Cosmic microwave background, Helium abundance, Anisotropies in the CMBR.

Recommended books:
J. V. Narlikar, General Relativity and Cosmology (Macmillan)
S. Carroll, Space and Geometry: An Introduction to General Relativity (Addison-Wesley)

Estimated student enrolment: 50

Departments to which the proposed course will be of interest:
Other faculty members interested in teaching the proposed course: G. Sengupta, K. Bhattacharya, D. Sehdev

Any other remarks: This is an elective course for the Physics (BS) students.

Elective course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: T. Sarkar

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Appendix 4

Indian Institute of Technology, Kanpur
Proposal for a New Course

Course No. : PHY422

Course title: Mathematical Methods II

Pre-requisite(s): PHY421

Credits: 3-1-0-0-[11]

Semester: Even

Department/IDP: Physics

Instructor(s): T. Sarkar

Course contents:


Recommended books:


Estimated student enrolment: 80

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: D. Chakrabarty, H. Wanare, M. K. Verma, K. Bhattacharya, R. Prasad

Any other remarks: This is an elective course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and elective for M.Sc-PhD dual degree students.
Dated:_______________ Proposer: T. Sarkar

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Proposal for a New Course

Course No. : PHY432

Course title: Quantum Mechanics II

Pre-requisite(s): PHY431

Credits: 3-1-0-0-[11]

Semester: Even

Department/IDP: Physics

Instructor(s): A. Singh

Course contents:

Bound State Perturbation Theory, Time-Dependent Perturbation Theory, Semiclassical Treatment of Radiation, Scattering Theory, Relativistic Wave Equations, Foundational Issues in Quantum Mechanics, Quantum Computation.

Recommended books:

J. L. Powell and B. Crasemann, Quantum Mechanics (Narosa)
R. P. Feynman, The Feynman Lectures on Physics vol. III (Pearson)
E. Merzbacher, Quantum Mechanics (Wiley)
S. Gasiorowicz, Quantum Physics (Wiley)
L. I. Schiff, Quantum Mechanics (Tata McGraw-Hill)
J. J. Sakurai, Modern Quantum Mechanics (Pearson)
L. D. Landau and E. M. Lifshitz, Quantum Mechanics (Elsevier)
C. Cohen-Tannoudji, Quantum Mechanics (Wiley)
D. J. Griffiths, Introduction to Quantum Mechanics (Pearson)

Estimated student enrolment: 80
Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: K. Bhattacharya, D. Chakrabarti, V. Subrahmanyam

Any other remarks: This is an elective course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated: _______________ Proposer: A. Singh

Dated: _______________ DUGC Convener: ____________________

The course is approved / not approved

Chairman, SUGC

Dated: __________________________
Indian Institute of Technology, Kanpur
Proposal for a New Course

Course No. : PHY441

Course title: Electronics

Pre-requisite(s):

Credits: 2-1-0-1-[11]

Semester: Odd

Department/IDP: Physics

Instructor(s): K. P. Rajeev

Course contents:

Review of network theorems and network analysis. Opamp characteristics & limitations. Negative feedback and applications of opamps such as amplifiers, current sources, filters. Extending the capability of opamps by combining them with discrete devices and other IC’s. Voltage regulators, Positive feedback, Schmitt triggers and oscillators. Gates, Flip-flops, Counters, Timers: applications such as water level sensors, Oscillators. Microcontrollers: Assembly Language Programming and a few illustrative applications such as controlling Diwali lights, stepper motors etc.

List of experiments:

1. Basics and introduction to the lab
2. OpAmps I: (amplifier & negative feedback)
3. OpAmps II: (limitations & applications)
4. Interfacing OpAmps with diodes: (clamp, rectifier, power supply)
5. Interfacing OpAmps with transistors I: (amplifiers)
6. Interfacing OpAmps with transistors II: (Schmitt trigger, oscillator, MOSFET)
7. Digital electronics I (logic gates)
8. Digital electronics 2 (flip-flops)
9. Microcontroller I: (basic feature)
10. Microcontroller II: (applications)
11. Microcontroller III: (stepper motor controller)

Recommended books:

"The art of electronics" by P. Horowitz and W. Hill
Estimated student enrolment: 70

Departments to which the proposed course will be of interest: EE, LTP

Other faculty members interested in teaching the proposed course: Krishnacharya, H. C. Verma, S. Bhattacharjee, A. K. Gupta

Any other remarks: This is an elective course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: K. P. Rajeev

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Course No. : PHY462

Course title: Experimental Physics II

Pre-requisite(s):

Credits: 0-0-0-2-[8]

Semester: Both

Department/IDP: Physics

Instructor(s): Y. N. Mohapatra

Course contents:

The laboratory will provide experimental set-up for more than approximately 40 different experiments (condensed matter physics, optical techniques, nuclear physics) of which at least six are compulsory for a student to complete. The list of experiments are provided in the regularly updated Laboratory Manual maintained by the Department of Physics. The experiments will be a judicious mix involving different techniques and specialties.

Recommended books:


Resource Files on Experiments maintained in the Laboratory.

P. R. Bevington, *Data Reduction and Error Analysis for Physical Sciences* (McGraw Hill)

Estimated student enrolment: 70

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: Z. Hossain, A. Pradhan, R. Gupta, S. Banerjee, Krishnacharya
Any other remarks:  This is an elective course for the Physics (BS) students.
Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: Y. N. Mohapatra

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Indian Institute of Technology, Kanpur
Proposal for a New Course

Course No.: PHY524
Course title: Atomic, Molecular and Optical Physics
Pre-requisite(s): PHY432
Credits: 3-1-0-0-[11]
Semester: Even
Department/IDP: Physics
Instructor(s): T. K. Ghosh

Course contents:

Recommended books:

Estimated student enrolment: 80
Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: H. Wanare, M. K. Harbola, H. C. Verma, S. Ghosh

Any other remarks: This is an elective course for the Physics (BS) students.
Elective course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated: ________________ Proposer: T. K. Ghosh

Dated: ________________ DUGC Convener: _______________________

The course is approved / not approved

Chairman, SUGC

Dated: ________________________________
Course No.: PHY526

Course title: Nuclear and Particle Physics

Pre-requisite(s): PHY432

Credits: 3-1-0-0-[11]

Semester: Even

Department/IDP: Physics

Instructor(s): P. Jain

Course contents:

Nuclear Physics: General properties of nuclei, Nuclear two body problem, Nuclear force and nuclear models, Nuclear decay, Nuclear reaction kinematics, Scattering and reaction cross section, Optical Model, Classification of nuclear reactions (compound nuclear, direct etc), Breit-Wigner resonance formula, Nuclear fission and fusion. Particle Physics: Natural Units, Evidence for four fundamental interactions, Leptons and hadrons, Historical introduction to the particle zoo, Introduction to cross sections and decay rates, Particle accelerators and detectors, Invariance principles and conservation laws, Experimental tests of parity, Charge conjugation, Time reversal and CP, Isospin, Strangeness.

Recommended books:

I. Kaplan, *Nuclear Physics* (Narosa)

K. S. Krane, *Introduction to Nuclear Physics* (Wiley)


Estimated student enrolment: 80

Departments to which the proposed course will be of interest:
Other faculty members interested in teaching the proposed course: D. Sahdev, D. Chakrabarty, K. Bhattacharjee, H. C. Verma

Any other remarks: This is an elective course for the Physics (BS) students.

Elective course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: P. Jain

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Indian Institute of Technology, Kanpur  
Proposal for a New Course

Course No.: PHY543

Course title: Condensed Matter Physics

Pre-requisite(s): PHY432

Credits: 3-1-0-0-[11]

Semester: Odd

Department/IDP: Physics

Instructor(s): R. Prasad

Course contents:


Recommended books:

C. Kittel, Introduction to Solid State Physics (Wiley)

N. W. Ashcroft and N. D. Mermin, Solid State Physics (Cengage Learning)

H. Ibach and H. Luth, Solid State Physics (Springer)
Estimated student enrolment: 80

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: A. Singh, S. Banerjee, M. K. Harbola, Y. N. Mohapatra, Krishnacharya

Any other remarks: This is an elective course for the Physics (BS) students.

Elective course for 2-year M.Sc and M.Sc-PhD dual degree students.

Dated:_______________ Proposer: R. Prasad

Dated:_______________ DUGC Convener:_______________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________
Indian Institute of Technology, Kanpur
Proposal for a New Course

Course No.: PHY553

Course title: Classical Electrodynamics II

Pre-requisite(s): PHY552

Credits: 3-1-0-0-[11]

Semester: Even

Department/IDP: Physics

Instructor(s): P. Jain

Course contents:

Special relativity, Minkowski space and four vectors, Concept of four-velocity, Four acceleration and higher rank tensors, Relativistic formulation of electrodynamics, Maxwell equations in covariant form, Gauge invariance and four-potential, The action principle and electromagnetic energy momentum tensor, Liénard-Weichert potentials, Radiation from an accelerated charge, Larmor formula, Bremsstrahlung and synchrotron radiation, Multipole radiation, Dispersion theory, Radiative reaction, Radiative damping, Scattering by free charges: applications to wave-guides, fibres and plasmas.

Recommended books:

J. D. Jackson, Classical Electrodynamics (Wiley)

Estimated student enrolment: 80

Departments to which the proposed course will be of interest:

Other faculty members interested in teaching the proposed course: M. K. Harbola, R. Vijaya, S. Bhattacharjee, G. Sengupta

Any other remarks: This is an elective course for the Physics (BS) students.

Compulsory course for 2-year M.Sc and M.Sc-PhD dual degree students.
Dated: _______________ Proposer: P. Jain

The course is approved / not approved

Chairman, SUGC

Dated: __________________________

1Dated: _______________ DUGC Convener: ____________________
Course No. : PSO201 (Science Option)

Course title: Quantum Physics

Pre-requisite(s):

Credits: 2-1-0-0-[8]

Semester: Even

Department/IDP: Physics

Instructor(s): M. K. Harbola

Course contents:

Foundations of quantum mechanics – Black body radiation, Photoelectric effect, Compton effect, de Broglie hypothesis and its experimental verification, Time-independent and time-dependent Schrodinger equation, Born interpretation, Expectation values, Free-particle wavefunctions and wavepackets, Uncertainty principle, Solution of stationary-state Schrodinger equation for particle in a box, Particle in a finite well, Reflection and transmission across a step potential, Application to phenomena like alpha-decay, One-dimensional harmonic oscillator, Solution of stationary-state Schrodinger equation for the ground-state of hydrogen, Discussion of excited-state, Explanation of the periodic table by introduction of electron spin and Pauli’s exclusion principle, Stern-Gerlach experiment, Two level systems, Free particle wavefunctions and metals, Kronig-Penny model and formation of bands in one dimension, Variational principle for approximate solutions and simple applications, Ground-state energy of helium atom, Interaction of light with matter – Einstein’s phenomenological theory, Lifetime of a state, LASERS

Recommended books:

Text book:

R. Eisberg and R. Resnick, Quantum physics (Wiley)

Reference books:

R. P. Feynman, The Feynman Lectures on Physics -volume 3 (Pearson)

M. Jammer, Conceptual development of quantum mechanics (Tomash Publishers)
B.L. van der Waerden, *Sources of quantum mechanics* (Dover Publications)

E. Shroedinger, *Papers on wave mechanics*


Estimated student enrolment: 210

Departments to which the proposed course will be of interest: MSE (Compulsory), CSE, EE

Other faculty members interested in teaching the proposed course: A. K. Gupta, H. C. Verma, T. K. Ghosh, Krishnacharya, A. Singh, A. Dutta

Any other remarks: This is a compulsory course for the Physics (BS) students.

Dated:_______________ Proposer: M. K. Harbola

Dated:_______________ DUGC Convener:___________________

The course is approved / not approved

Chairman, SUGC

Dated:______________________________