THE RUTGERS UNDERGRADUATE
PHYSICS PROGRAM: PREPARING
STUDENTS FOR VARIED CAREERS

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APS MARCH MEETING
MARCH 17, 2009
PITTSBURGH, PA
CURRICULUM OPTIONS FOR PHYSICS MAJOR

1) PROFESSIONAL OPTION (B.S.)
   - For students intending to go on for Ph.D. in Physics

2) ASTROPHYSICS MAJOR (B.S.)
   - Like the Professional Option, but for those who aspire to Ph.D. in Astronomy/Astrophysics

3) APPLIED OPTION (B.S.)
   - Preparation for careers in industry or patent law
   - Engineering double majors

4) GENERAL OPTION (B.A.)
   - Preparation for careers in high school teaching, medicine, business/finance, etc.

5) OCEAN PHYSICS OPTION (B.S.)
   - Preparation for careers in marine sciences
GRADUATE 35-40 MAJORS EACH YEAR:

30% PROFESSIONAL OPTION
10% ASTROPHYSICS MAJOR
30% APPLIED OPTION
30% GENERAL OPTION

OCEAN PHYSICS OPTION JUST GOT GOING. FIRST GRADUATE LAST YEAR.

OTHER FEATURES:

1) SINGLE ADVISER FOR ALL PHYSICS MAJORS
2) SEVEN $5500 MERIT-BASED SCHOLARSHIPS AWARDED EACH YEAR. TWO OF THESE RESERVED FOR WOMEN MAJORS.
3) ACTIVE SPS CHAPTER:
   - MONTHLY SPEAKERS
   - GRE STUDY SESSIONS
   - FIELD TRIPS
PROFESSIONAL OPTION (B.S.)

FALL TERM

YEAR 1: HONORS PHYSICS I
        PHYSICS LAB I
        CALCULUS I

YEAR 2: HONORS PHYSICS III
        MECHANICS II
        INTERMEDIATE LAB
        CALCULUS III

YEAR 3: E&M I
        MODERN PHYSICS LAB
        QUANTUM/ATOMIC

YEAR 4: INTERMEDIATE QUANTUM
        OPTICS
        HONORS PROJECT

SPRING TERM

YEAR 1: HONORS PHYSICS II
        PHYSICS LAB II
        CALCULUS II

YEAR 2: THERMAL PHYSICS
        MECHANICS II
        ELECTRONICS LAB
        ORD. DIFF. EQ.

YEAR 3: E&M II
        MODERN PHYSICS LAB
        PARTIAL DIFF. EQ.

YEAR 4: NUCLEI AND PARTICLES
        SOLID-STATE PHYSICS
        HONORS PROJECT

MANY ELECTIVES ALSO AVAILABLE,
ESPECIALLY ASTROPHYSICS.
ASTROPHYSICS MAJOR (B.S.)

Most course requirements are the same as for professional option, except:

Replace "Year 2" physics labs by two terms of Principles of Astrophysics.

Replace "Year 3" physics labs by:
- Observational Optical Astronomy (20-inch telescope)
- Observational Radio Astronomy (10-foot telescope)

Must take at least two advanced electives:
- Stars
- Galaxies
- Cosmology
- High Energy Astrophysics
GENERAL OPTION (B.A.)

1) ANY INTRODUCTORY PHYSICS SEQUENCE, INCLUDING INTRODUCTORY LABS

2) ANY CALCULUS SEQUENCE

3) SIX INTERMEDIATE PHYSICS COURSES, OUT OF:
   - ADVANCED GENERAL PHYSICS (2 TERMS) (RECOMMENDED)
   - MODERN PHYSICS
   - PHYSICS OF MODERN DEVICES
   - PHYSICS OF SOUND
   - OPTICS
   - ASTROPHYSICS (2 TERMS)
   - INTERMEDIATE LAB (REQUIRED)
   - ELECTRONICS LAB (REQUIRED)

4) SIX NATURAL SCIENCE COURSES (COULD BE MORE PHYSICS).

ASPIRING TEACHERS DO 5-YEAR PROGRAM WITH RUTGERS GRADUATE SCHOOL OF EDUCATION. AFTER 5TH YEAR, GET MASTER'S DEGREE AND TEACHER CERTIFICATION.
APPLIED OPTION (B.S.)

1) ANY INTRODUCTORY PHYSICS SEQUENCE, INCLUDING INTRODUCTORY LABS
2) TWO TERMS OF CHEMISTRY, INCLUDING LABS.
3) FOUR TERMS OF CALCULUS
4) COURSE IN COMPUTING FOR MATH AND THE SCIENCES (INCLUDES MATLAB AND MAPLE).
5) REQUIRED PHYSICS COURSES:
   - ADVANCED GENERAL PHYSICS (2 TERMS)
   - MODERN PHYSICS
   - OPTICS
   - THERMAL PHYSICS
   - INTERMEDIATE LAB
   - ELECTRONICS LAB
   - MODERN PHYSICS LAB
UNUSUAL ADVANCED GENERAL PHYSICS COURSE

TWO TERMS, SELF-PACED.
26 "UNITS" COVERING PHYSICS TOPICS:
MECHANICS/RELATIVITY: 7 UNITS
THERMAL PHYSICS: 5 UNITS
E&M: 6 UNITS
MODERN PHYSICS: 8 UNITS

EACH UNIT HAS SOME SUGGESTED READING AND HOMEWORK.
NO LIVE LECTURES; SOME UNITS HAVE VIDEO TAPE LECTURES.
IN CLASS, INSTRUCTORS CIRCULATE AMONG STUDENTS AND HELP WITH HOMEWORK.
WHEN A STUDENT FEELS S/HE HAS MASTERS A UNIT, S/HE IS GIVEN A QUIZ, GRADED PASS/FAIL.
FINAL COURSE GRADE DEPENDS ON HOW MANY QUIZZES WERE PASSED.
FOR AN "A" GRADE, MUST PASS 10 QUIZZES AND AN ORAL EXAM.
APPLIED/GENERAL MAJORS AFTER GRADUATION

LAW SCHOOL FOR PATENT LAW
GRADUATE SCHOOL OF EDUCATION
EDMUND OPTICS (APPLICATIONS ENGINEER)
IMAGE WARE SYSTEMS (BIOMETRICS)
THOR LABS (OPTICS, PHOTONICS)
PETHO-LUBRICANT TEST LABS
KULITE SEMICONDUCTORS (PRESSURE TRANSDUCERS)
LOCKHEED MARTIN
FARIDUS INDUSTRIES (COMPUTER SERVICING)
RAYTHEON
HIGH POWER DEVICES INC. (BOUGHT BY INTENSE LTD.)
ITT CORP.
LUCENT TECH.
LEVEL 8 SYSTEMS (ELECTRONIC MEDICAL RECORDS)
PRUDENTIAL INSURANCE
DEUTSCHE BANK
BANK OF AMERICA
PSE&G (UTILITY IN NEW JERSEY)
TUMI INC.
ACCENTURE (MANAGEMENT CONSULTING)
BLOOMBERG
US MARINE CORPS (3 IN LAST FEW YEARS)
INDIAN HEAD NAVAL SURFACE WARFARE CENTER
OCEAN PHYSICS OPTION (B.S.)

In cooperation with Rutgers Department of Marine and Coastal Sciences.

Most requirements are the same as for Applied Option. But require only 4 intermediate physics courses instead of 8. Replace other 4 by:

- Physical Oceanography
- Dynamics of Marine Ecosystems
- Oceanographic Methods and Data Analysis
- Special Problems in Marine and Coastal Sciences.

This option is in its infancy. First graduate in class of 2003.
CONCLUSIONS

1) PHYSICS MAJORS HAVE A WIDE VARIETY OF CAREER ASPIRATIONS. MULTIPLE CURRICULUM OPTIONS SEEM TO HELP.

2) "JOINT VENTURES" WITH OTHER UNITS IN UNIVERSITY HELP BOTH THEM AND US. EXAMPLES: GRADUATE SCHOOL OF EDUCATION, SCHOOL OF ENGINEERING, DEPT. OF MARINE SCIENCES.

3) GRADUATES TELL US THAT THEY ESPECIALLY BENEFITED FROM COURSES IN "HOW THINGS WORK" AND MODERN PHYSICS LABS. SELF-PACED COURSES ARE PRAISED BY MOST, BUT DISLIKED BY A FEW.

4) EDMUND OPTICS HAS SET A GREAT EXAMPLE BY GIVING TALKS TO OUR OPTICS CLASS. WE NEED MORE SUCH EXAMPLES.