

# The Pathway

A NEWSLETTER FOR UNDERGRADUATE CHEMISTRY MAJORS  
AT THE UNIVERSITY OF MASSACHUSETTS AT AMHERST

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## PROFESSOR DAY NAMED UNDERGRADUATE RESEARCH COORDINATOR

Professor Roberta O. Day has been named Chemistry Department Undergraduate Research Coordinator. In this capacity, she will assist chemistry majors in identifying suitable projects throughout the entire Department with which to satisfy the Department's new undergraduate research requirement.



An inorganic chemist, Prof. Day holds a B.S. from the University of Rochester and a Ph.D. from the Massachusetts Institute of Technology. Her research involves the use of x-ray diffraction analysis to explore relationships between molecular structure and chemical properties. In 1990, she received the American Chemical Society Connecticut Valley Section Award for outstanding contribution to chemistry.

Prof. Day's office is 512 Lederle Graduate Research Tower A. BS students should contact her early in their programs, certainly by no later than the beginning of the second semester of the junior year, to plan their research programs.

## POST-COMMENCEMENT RECEPTION PLANNED

The Chemistry Department will sponsor its sixth annual reception for its graduating seniors and all their Commencement guests. The reception will be held in the Lederle Graduate Research Center immediately following Commencement on Sunday, May 26, and will be attended by many faculty members. A complimentary buffet luncheon will be featured.

Graduating seniors who wish to participate in the reception are asked to so advise Prof. Wynne - Goessmann 244 - as soon as possible. Invitations to all known guests will be issued by the Department.

## NEW B.A. AND B.S. PROGRAMS APPROVED

New B.A. and B.S. programs have been approved by the Chemistry Faculty. Both programs will include Chemistry 242, a new inorganic chemistry laboratory course to be taken in the sophomore year concurrent with Chemistry 241.

Other major changes in the B.A. curriculum are the requirements of Chemistry 475, 476, and 477 in place of Chemistry 471 and 472 and Physics 161 and 162 in place of Physics 141 and 142. Because it is a prerequisite for Chemistry 475, Mathematics 233 will be included.

The new B.S. program features a reduction in the upper level chemistry course requirements and the inclusion of an undergraduate research project.

The old B.A. and B.S. programs apply to the class of '91. Current frosh as well as students who transfer to the Chemistry Department from other schools and from other UMass majors will be expected to satisfy the new requirements. Members of the classes of '92 and '93 may elect to satisfy either the old curriculum or the new curriculum but not a hybrid of both. Because they will have taken Chemistry 268, with its inorganic chemistry laboratory component, the latter will not take Chemistry 242. To satisfy the total laboratory requirement, members of the classes of '92 and '93 who elect one of the new curricula must take any one of the upper level laboratory courses in addition to the upper level laboratory requirement of the new program.

Copies of the new curricula may be obtained in the Department Main Office, 102 Lederle Graduate Research Tower A.

## NEW BACHELOR OF ARTS CURRICULUM

The B.A. curriculum requires the following courses. PHYSIC 263 is recommended but not required. The upper-level chemistry requirement is three credits chosen from a list of courses available from the Chemistry Department. Where options exist, the option recommended is noted by an asterisk (\*).

Freshman

<u>Fall</u>	<u>Spring</u>
CHEM 111M* or 111	CHEM 112M* or 112
MATH 135A* or 131	MATH 136A* or 132
Writing	PHYSIC 161
Language	Language

Sophomore

<u>Fall</u>	<u>Spring</u>
CHEM 265*, 267*	CHEM 241, 242
or 261, 263	CHEM 266*, 268*
MATH 233	or 262, 264
PHYSIC 162	CHEM 291A
Language	Language

Junior

<u>Fall</u>	<u>Spring</u>
CHEM 391A	CHEM 475
CHEM 475	CHEM 312* or
<u>Spring</u>	315 (fall semester)

Senior

Upper-level chemistry requirement (3 credits)

## NEW BACHELOR OF SCIENCE CURRICULUM

The requirements of the first four semesters of the B.S. curriculum are identical to those of the B.A. curriculum. The program of the junior and senior years is given below. PHYSIC 181, 182, 283, and 284 may be substituted for PHYSIC 161, 162, and 263, a substitution encouraged for students interested in chemical physics. A student who elects the four semester physics sequence should take PHYSIC 181 in the first semester of the freshman year. The upper-level chemistry requirements include an independent project done following the guidelines of the Undergraduate Research Coordinator plus a minimum of eight credits of upper-level lecture and laboratory courses. Details of these requirements are available from the Chemistry Department. A student who completes this curriculum will be certified to the American Chemical Society if CHEM 513 (Instrumental Analysis) and CHEM 546 (Advanced Inorganic Chemistry I) are included in the upper-level selections.

Junior

<u>Fall</u>
CHEM 315
CHEM 391A
CHEM 475
PHYS 263 (may be taken in the sophomore year)

Spring

CHEM 476, 477
Upper-level chemistry courses **

Senior

Independent project
Upper-level chemistry courses **

\*\* A total of at least 8 credits of upper-level chemistry courses must be taken during the junior and senior years. The independent project is not included in this total.

## NEW SCIENCE/CHEMISTRY CURRICULUM ANNOUNCED

A new curriculum for the Science/Chemistry major, similar to the old B.A. in Chemistry curriculum, has been announced. Although this interdepartmental program is administered by the College of Arts and Sciences Information and Advising Center (CASIAC), the program of a student who wishes to major in Science with a chemistry concentration must be approved by the Chemistry Department. Science may be an attractive major for a number of students, including those who wish to become secondary school teachers.

Copies of the Science/Chemistry curriculum may be obtained in the Chemistry Department Main Office, 102 Lederle Graduate Research Towers.

## NEW SCIENCE/CHEMISTRY MAJOR

All required courses must be taken for a letter grade (not Pass/Fail)

## I. FOUNDATION REQUIREMENTS

1. Mathematics [see note (1)]
  - Recommended: MATH 131 and MATH 132
  - Acceptable: MATH 127 and MATH 128
2. Physical Science
  - a) Chemistry
    - Recommended: CHEM 111M and CHEM 112M
    - Acceptable: CHEM 111 and CHEM 112
  - b) Physics [see note (1)]
    - Recommended: PHYSIC 161 and PHYSIC 162
    - Acceptable: PHYSIC 141 and PHYSIC 142
  - c) One additional course [see note (1)]
    - An approved 100-level or higher course in any FNSM department except Biochemistry, Botany, Microbiology, or Zoology
3. Life Sciences
  - BOTANY 100 and ZOOL 102 or
  - BIOL 100 and BIOL 101

## II. DEPTH REQUIREMENTS

1. Primary Concentration
  - CHEM 241, 242
  - CHEM 250, 252 [see note (2)]
  - CHEM 312
  - CHEM 471 [see note (1)]
  - CHEM 472 [see note (1)]
  - BIOCHM 420
2. Secondary Concentration
  - At least four 100-level or higher courses in a single FNSM program other than Biochemistry or Chemistry. These may include courses used to satisfy the Foundation Requirements.

## III. ADDITIONAL COURSES

A sufficient number of 200-level or higher courses to bring the total in categories I, II, and III to 20 courses. These must be FNSM courses except that as many as two may be selected from the approved list of History, Philosophy, and Psychology courses.

## IV. JUNIOR WRITING REQUIREMENT [see note (3)]

CHEM 391A

## V. SOPHOMORE SEMINAR [see note (3)]

CHEM 291A - Although not required, this one credit course is strongly recommended.

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## NOTES:

(1) CHEM 475 and CHEM 476 may be substituted for CHEM 471 and CHEM 472. This substitution requires MATH 131, MATH 132, and MATH 233, as well as PHYSIC 161 and PHYSIC 162. MATH 233 may be used as the one additional course under physical science foundation requirements (category I. 2. c) or as one of the four depth requirement secondary concentration courses (category II. 2) or as one of the additional courses of category III. Combinations such as CHEM 475 and CHEM 472 and CHEM 471 and CHEM 476 are not allowed.

(2) CHEM 261, 263 and CHEM 262, 264 or CHEM 265, 267 and CHEM 266, 268 may be substituted for CHEM 250, 252. This substitution provides two of the required total of 20 courses (category III) but has no effect on any other requirement.

(3) Neither the Junior Writing Course (CHEM 391A) nor the Sophomore Seminar (CHEM 291A) satisfies any of requirements I, II, or III.

#### SIX UNDERGRADUATE STUDENTS WIN 1990 AWARDS

Six undergraduate students were winners of 1990 awards. Senior Sepideh Khorasanizadeh received the award of the Connecticut Valley Section of the American Chemical Society (CVS/ACS). Senior Andrew K. Gelasco was the winner of the Merck Index Award. Jean W. Young, '91, was named the winner of the American Chemical Society Division of Analytical Chemistry Award (ACS/AC). Freshman Chemistry Awards went to Rony W. Chung, Hoi Hung Ho, and David M. Hutton, all members of the class of '93.

The CVS/ACS Award includes a one-year membership to the American Chemical Society, a subscription to the ACS journal of the student's choice, and an embossed certificate. It is presented annually at the CVS Undergraduate Student Research Symposium, held in 1990 at Trinity College in Hartford. Traditionally, the award winner presents a paper on his/her undergraduate research. At the 1989 Symposium, held at Williams College, Sepideh, who completed her course work in December, 1989, had presented a paper based on her undergraduate research with Prof. Barrie Tan. She is now in the graduate program at the University of Pennsylvania in Philadelphia. Sepideh was also nominated to Phi Lambda Upsilon, a national society which honors students who achieve excellence in chemistry.

As the winner of the Merck Index award, Andrew received a copy of the most recent edition of the Merck Index with his name imprinted in gold on the front cover. He did undergraduate research with Prof. Michael Maroney and is now an inorganic chemistry graduate student at the University of Michigan at Ann Arbor.

The ACS/AC Award includes an 8-month subscription to the journal "Analytical Chemistry" and an 8-month membership in the ACS Division of Analytical Chemistry. To qualify, a student must complete his/her junior year and demonstrate a clear interest in analytical chemistry. Continuing work started on a 1990 Pfizer Summer Fellowship, Jean is doing undergraduate research with Prof. Peter Uden.

Each Freshman Chemistry Award was a copy of the 71st edition of the CRC Press "Handbook of Chemistry and Physics" with a commemorative scroll attached to the inside front cover. Of the three winners only Hoi Hung, who received her high school training in England, is a chemistry major. Rony, a graduate of Minnechaug Regional High School in Wilbraham, Mass., is an electrical engineering major. David, who graduated from Duxbury, Mass., High School, is majoring in mechanical engineering.

## UMASS STUDENTS PARTICIPATE IN PFIZER UNDERGRADUATE RESEARCH FORUM

Julie Lehrman and Jean Young, both members of the class of '91, were among the invited participants in an undergraduate student research poster session held on October 12, 1990, at Pfizer Central Research in Groton, Conn. The poster session featured the work of seventeen students from twelve New England colleges and universities. The seventeen students had been awarded Pfizer Fellowships during the summer of 1990. The UMass Chemistry Department had been invited to nominate two students, both of whom were selected by Pfizer. Pfizer Summer Fellowships provide the opportunity for a student who has completed the junior year to spend a summer on his/her campus doing research which will be continued as a senior project.

Julie, who has been working with Prof. Peter Lillya, presented a poster entitled "Discotic Liquid Crystals." The title of Jean's poster was "Method Development for the Analysis of Paraben Antioxidants in Body Fluids." She has been working with Prof. Peter Uden. In addition, Jean presented a poster on "Analytical Methods for the Study of Clinical Samples in Pharmacokinetic Investigations" at the annual Chemistry Department Research Symposium on October 27, 1990.

## Amino acid fluorides to aid peptide synthesis

(Reprinted from Chemical and Engineering News, December 24, 1990)

A series of amino acid derivatives reactive enough to condense readily in high yields with other amino acids, but stable enough to have a long shelf life, has been invented by chemists at the University of Massachusetts, Amherst [*J. Am. Chem. Soc.*, 112, 9651 (1990)]. The new reagents may find use in peptide syntheses in the solid state or in solution.

The reagents are *N*-9-fluorenylmethoxycarbonyl (FMOC) amino

acid fluorides. Organic chemistry professor Louis A. Carpino made them by reacting FMOC-amino acids with cyanuric fluoride, which came from the reaction of cyanuric chloride with sodium fluoride in sulfolane. Carpino did the work with graduate student Dean Sadat-Aalae, postdoctoral fellow Hann Guang Chao, and undergraduate Robert H. DeSelms.

The Amherst workers even made stable amino acid fluorides from *tert*-butyl derivatives of serine, threonine, tyrosine, and aspartic and glutamic acids, from a *tert*-butoxycarbonyl derivative of lysine, and from underivatized tryptophan. The corresponding FMOC-amino acid chlorides either cannot be made or decompose within a short time during storage.

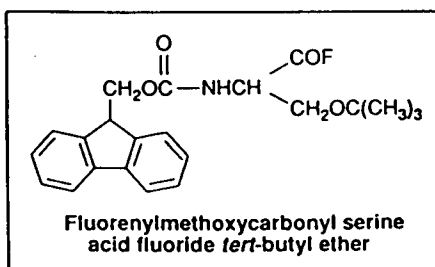
In demonstrations with FMOC-amino acid fluorides, the Amherst

chemists made the heptapeptide Val-Asp-Val-Leu-Leu-Ser-Tyr as the FMOC *tert*-butylated form in 33% yield by a continuous series of rapid solution condensations, without isolation of intermediates. Treatment first with tris(aminoethyl)amine and next with cresol gave the free heptapeptide.

A second demonstration was solid-phase preparation of 75 mg of Ala-Asn-Lys-Gly-Phe-Leu-Glu-Glu-Val in a batch synthesizer. This nonapeptide represents amino acids one through nine of prothrombin. Addition of each amino acid took 10 minutes per cycle.

Research Corp. Technologies, Tucson, Ariz., will seek patent protection for the FMOC-amino acid fluorides and their use in peptide synthesis. It also will negotiate licenses for the university.

Stephen Stinson



#### JULIE LEHRMAN NAMED AN ALUMNI SCHOLAR

Joining a very select group of UMass undergraduate students, Julie M. Lehrman, '91, has been named a "William Field Alumni Scholar". Alumni Scholarships are funded by alumni contributions and administered by the Alumni Office. Each Alumni Scholar receives a \$750 cash award to be applied towards the payment of the senior year bill.

To qualify for an Alumni Scholarship, a student must be in the second semester of his/her junior year, have a minimum of sixty graded credits in residence at UMass/Amherst (this eliminates most transfer students), and possess a very high cumulative average. Competition for Alumni Scholarships is intense; generally, only six are awarded in the entire nine undergraduate departments in the Faculty of Natural Sciences and Mathematics.

#### ACS RENEWS ANALYTICAL CHEMISTRY SUMMER INTERN PROGRAM

The Division of Analytical Chemistry of the American Chemical Society has renewed its Summer Intern Program in 1991. The Program provides summer employment opportunities in analytical chemistry. Positions may be in industrial, academic, or government laboratories. Juniors, seniors, and first year graduate students with an interest in analytical chemistry are invited to apply. Applicants are selected by a national committee chaired by Prof. David Curran of this Department.

Application forms may be obtained from Prof. Curran (GSMN 269). Completed applications, accompanied by two letters of recommendation, must be submitted to Prof. Curran by February 15, 1991.

UNDERGRADUATE STUDENT SUMMER RESEARCH OPPORTUNITIES AVAILABLE

A number of institutions are offering summer research opportunities to undergraduate chemistry majors. Generally, students who will have completed their junior year by May, 1991, are solicited. However, some offers are for students less advanced in the chemistry program. The undergraduate student bulletin board, located in Goessmann Laboratory opposite rooms 146 and 147, includes notices from the following:

- California Institute of Technology (Pasadena)
- Carnegie Mellon University (Pittsburgh, PA)
- Miami University (Oxford, OH)
- Mount Sinai School of Medicine (New York, NY)
- NASA, Goddard Space Flight Center (Greenbelt, MD)
- Oregon State University (Corvallis)
- Pennsylvania State University (University Park)
- Rensselaer Polytechnic Institute (Troy, NY)
- Rockefeller University (New York, NY)
- Roswell Park Cancer Institute (Buffalo, NY)
- Society of Toxicology (Washington, DC)
- Syracuse University (Syracuse, NY)
- University of Arizona (Tucson)
- University of California (Irvine)
- University of Delaware (Lewes)
- University of Massachusetts Medical Center (Worcester)
- University of Michigan (Ann Arbor)
- University of Minnesota (Minneapolis)
- University of North Carolina (Chapel Hill)
- University of Southern California (Los Angeles)
- University of Texas Southwestern Medical Center (Dallas)
- University of Washington (Seattle)

It is suggested that undergraduate students check the bulletin board very soon because deadlines for application to many of these institutions are not far off.

The bulletin board includes notices of several additional interesting summer programs as well as announcements of internships and cooperative positions.