Department of Chemistry and Biochemistry

Cal State LA New Major Orientation
Dr. Alison McCurdy, Chair

WELCOME!

Updated Summer, 2017
Some Key People:

Department Chair:
Dr. Alison McCurdy
- [amccurd@calstatela.edu](mailto:amccurd@calstatela.edu)
- 323-343-2300, BS 336 (Department office)

Department Office Staff:
Ms. Maribel Estrada
- 323-343-2300, BS 336 (Department office)
Some Key People:

**Stockroom Manager:**
Mr. Bill Wimberley
- 323-343-2345, ASCB 251

**Manager of Instructional Labs:**
Dr. Errol Mathias
- 323-343-5648, ASCL 132

Labs: Goggles, notebook, Breakage card from the cashier!
Some Key People (outside the Department):

Dean of the College of Natural and Social Sciences:
Dr. Pamela Scott-Johnson
• 323-343-2000, ACSB 223

Provost and Vice President for Academic Affairs:
Dr. Lynn Mahoney

President of Cal State LA:
Dr. William A. Covino
Some Key Places:

Department Office – 3rd floor
Biological Sciences BS 336

Faculty Offices, Teaching labs, research labs

Annenberg Science Complex:
- Rosser Hall or ASCR (27B)
- La Kretz Hall or ASCL (27A)
Some Key Websites:

Department:
http://www.calstatela.edu/dept/chem

NSS Advisement Center:
http://www.calstatela.edu/nssadvising

E-catalog, myCSULA
Breakout Session #1

In groups of 3-4, introduce yourselves, your major, your career goals, and tell everyone something surprising about you.

(optional!)
Some general advice.....

- Talk to your professors if you need help. Or even if you don’t! (This helps you get letters of recommendation!)
- Meet your classmates and form study groups!
- Rule of thumb: **Study 3 hours outside of class per unit per week.** More for harder classes!
- You need to think about your GPA (for the next stage in your career), so make sure the balance of school and other commitments allows you to focus on academic success.
Some general advice…..

Get involved with extracurricular activities such as:

- Chemistry and Biochemistry Club
- Pre-Pharmacy Club

Depending on your career goals, there are experiences outside the classroom:

- Volunteering at a hospital
- Getting involved in research

There is a Health Careers Advisement Office

http://www.calstatela.edu/healthcareers
KH D 1044
healthcareers@calstatela.edu
323-343-5284
Undergraduate Degree Programs

Students graduate with:

1. **Knowledge of the Field** - Theoretical and Practical
   - Chemistry and Biochemistry - the *molecular sciences*
   - New discoveries all the time
     - New molecules
     - New methods
     - Answers to problems in environment, health, etc.

2. Problem-solving Skills
3. Experience with Teamwork
4. Effective Communication Skills
Undergraduate Degree Programs
B.S. Chemistry or B. S. Biochemistry

• Suitable for students seeking:
  • Entry-level jobs as chemists
  • Entry into a graduate research program (M.S., Ph.D., etc)
  • Entry into health professions schools
  • Department web page has a section on careers

• Laboratory-intensive
• Department Honors Program available
• General Chemistry is the foundation; degree then focuses on subdisciplines: Analytical, Biochemistry, Inorganic, Organic, Physical
• Opportunities for Research Experiences!!
Planning for timely graduation

Know the Degree Requirements

• Degree Checklist (handout)
• ORDER MATTERS! Visual Scheme of pre-requisites/ordering of classes (handout); Roadmaps (handout). For example:
  • You must finish Gen Chem II, MATH 2120 and PHYS 2200 before starting physical chemistry (CHEM 4420-thermo)
  • You must finish Gen Chem II (CHEM 1110) before starting Ochem I (CHEM 2200)
Degree planner in catalog. Check off requirements as you go…. (BUT: lists don’t tell you what order you need to do them in!)

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Credits</th>
<th>Term Taken</th>
<th>Grade</th>
<th>Gen Ed</th>
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<tbody>
<tr>
<td>CHEM 1100 - General Chemistry I</td>
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<tr>
<td>CHEM 1110 - General Chemistry II</td>
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<tr>
<td>CHEM 2200 - Organic Chemistry I</td>
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<tr>
<td>CHEM 2201A - Organic Chemistry Laboratory I</td>
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<td>CHEM 2211T - Organic Chemistry Laboratory II</td>
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<td>MATH 2100 - Calculus I</td>
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<td>MATH 2120 - Calculus II</td>
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<td>MATH 2130 - Calculus III</td>
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<td>MATH 2150 - Differential Equations</td>
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<td>PHYS 2100 - General Physics I Mechanics and Thermodynamics</td>
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<td>PHYS 2200 - General Physics IIElectromagnetism and Optics</td>
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**Upper Division Required Courses (37 units)**

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<tr>
<td>CHEM 3100 - Writing for Chemistry</td>
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<tr>
<td>CHEM 3200 - Organic Chemistry II</td>
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<tr>
<td>CHEM 3500 - Quantitative Analysis</td>
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<tr>
<td>CHEM 3600 - Inorganic Chemistry</td>
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<tr>
<td>CHEM 4300 - Introduction to Biochemistry</td>
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<tr>
<td>CHEM 4410 - Physical Chemistry: Quantum Mechanics and Kinetics</td>
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<tr>
<td>CHEM 4431 - Physical Chemistry Laboratory</td>
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<tr>
<td>CHEM 4810 - Advanced Synthetic Methods</td>
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<tr>
<td>CHEM 4420 - Physical Chemistry: Thermodynamics</td>
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<tr>
<td>CHEM 4436 - Physical Chemistry: Quantum Chemical Methods</td>
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Students must select 2 courses from the following Advanced Analytical Chemistry course options. The third course may be used as an elective:

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<tr>
<th>Course Name</th>
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<tbody>
<tr>
<td>CHEM 4510 - Advanced Analytical Chemistry: Optical Spectroscopy</td>
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<tr>
<td>CHEM 4520 - Advanced Analytical Chemistry: Analytical Separations and Mass Spectrometry</td>
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<tr>
<td>CHEM 4530 - Advanced Analytical Chemistry: Electrochemistry and Surface Techniques</td>
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<tr>
<td>CHEM 4990 - Molecular Science Capstone</td>
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</table>
This scheme shows the order of classes – but adapt it to YOUR situation (what math are you starting in, etc.)

ILLUSTRATION OF WHICH COURSES ARE PRE/CO-REQUISITES FOR OTHERS: BS CHEMISTRY SEMESTERS

Solid arrows are pre-requisites (MUST be completed with a C- or better before taking the course)
Dashed arrows are co- or pre-requisites ((MUST be completed with a C- or better before taking the course OR during the same term as the course)

*Satisfactory completion of GWAR is a pre-requisite
**Take two of these three Advanced Analytical (AA) courses
***Also requires passing grade on the GWAR, completion of Blocks A and B4, an additional course from Block B, and at least one course each from blocks C and D.

Remember that if you are a BS Chemistry major, you should NOT take lower division GE Physical Sciences or lower division GE quantitative reasoning because your major coursework satisfies these requirements. CHEM 4890 satisfies Upper division GE Block B.

Revised 7/17
Biochemistry, B.S.
The Bachelor of Science degree in Biochemistry is designed to fit the needs of those who plan to complete their formal education with the bachelor's degree and obtain positions in scientific and industrial laboratories, or go on to graduate study in biochemistry or molecular life sciences.

The total number of units required for the Bachelor of Science degree in Biochemistry is 120 units, of which 84 units are in the major. Consult with an advisor for the specific number of units required in all areas of the degree including GE and free electives.

Requirements for the Major (84 units)

### Lower Division Required Courses (46 units)

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<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>CHEM 1100 - General Chemistry I</td>
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<td>CHEM 1110 - General Chemistry II</td>
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<td>CHEM 2200 - Organic Chemistry I</td>
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<tr>
<td>CHEM 2201T - Organic Chemistry Laboratory I</td>
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<tr>
<td>CHEM 2211T - Organic Chemistry Laboratory II</td>
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<tr>
<td>BIOL 1100 - Principles of Biology I</td>
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<tr>
<td>BIOL 1200 - Principles of Biology II</td>
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<td>MATH 2110 - Calculus I</td>
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<td>MATH 2120 - Calculus II</td>
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<tr>
<td>PHYS 2100 - General Physics I: Mechanics and Thermodynamics</td>
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<tr>
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### Upper Division Required Courses (31 units)

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<tr>
<td>CHEM 3500 - Quantitative Analysis</td>
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<tr>
<td>CHEM 3500 - Organic Chemistry II</td>
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<td>CHEM 3100 - Writing for Chemists</td>
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<tr>
<td>CHEM 4420 - Physical Chemistry: Thermodynamics</td>
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<td>CHEM 4310 - Biochemistry I</td>
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<tr>
<td>CHEM 4320 - Biochemistry II</td>
<td>(3)</td>
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<td>CHEM 4311T - Biochemistry Laboratory I</td>
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<tr>
<td>CHEM 4321T - Biochemistry Laboratory II</td>
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<tr>
<td>CHEM 4890 - Molecular Science Capstone</td>
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### Upper Division Electives (7 units)

Students must take a minimum of 2 units of coursework listed under Chemistry and a minimum of 2 units of coursework listed under Biology and Microbiology totaling 7 units to meet the major electives requirement for the Biochemistry B.S. program. Students may apply a maximum of 1 unit of CHEM 4890 to fulfill the elective requirement.

Students that seek to earn a BS Biochemistry degree that is approved by the American Chemical Society can do so by choosing an elective and an additional upper division chemistry course that includes at least one unit of laboratory, or one unit of directed laboratory research (CHEM 4890).

Please note that some of the below electives have prerequisites. Students should consult their adviser.
ILLUSTRATION OF WHICH COURSES ARE PRE/CO-REQUISITES FOR OTHERS: BS BIOCHEMISTRY SEMESTERS

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Dashed arrows are co- or pre-requisites (MUST be completed with a C- or better before taking the course OR during the same term as the course)

*Satisfactory completion of GWAR is a pre-requisite

***Also requires passing grade on the GWAR, completion of Blocks A and B4, an additional course from Block B, and at least one course each from blocks C and D.

Remember that if you are a BS Biochemistry major, you should NOT take lower division GE Biological Sciences; lower division GE Physical Sciences, or lower division GE quantitative reasoning because your major coursework satisfies these requirements. CHEM 4890 satisfies Upper division GE Block B.

Revised 7/17
Planning for timely graduation

- Course offerings: some courses are offered more than once a year, some only once! See Course Offerings Schedule available on the department website.
First year

• Start your math right away! Do NOT take GE math classes (MATH 1000, 1020, 1090) – this requirement is covered in your major
  • DO take MATH 0920, then MATH 0930, then Precalculus (MATH 1040), then MATH 2110, etc. (where you start depends on your math placement).
• Start your majors classes right away! (CHEM 1100)
• Take NSS 1001 in your first semester
• Try to complete Block A in your first year as well
  • ENGL 1005AB or ENGL 1010
  • Other Block A: COMM 1100, Critical Thinking
Planning for timely graduation

If needed classes are closed:
• Come to the first day of class in case instructors can add you
• Sometimes additional sections are authorized, so be alert

As you progress in your studies, you may want to get a minor…Our department offers a Minor in Bioinformatics! There is also a minor in Forensics!
What does 1 unit mean? It depends!

What do the course numbers and number of units mean?
1000-level is Freshmen; 2000-level is Sophomore; 3000-level is Junior; 4000-level is senior. 3000-4000 level is called “upper division”
CHEM 1100† - General Chemistry I (5)

A course may include:
• Just lecture or
• lecture and lab or
• lecture and lab and recitation or
• just lab!

How do you know? Check the catalog!

For General Chemistry, there are 3 lecture units (=3 x 50 minutes of lecture) and 2 lab units (= 2 x 3 hours of lab).
Breakout Session #2

Plan what you will be taking the first two years at CSULA, in your Major.

(Later, please also add in your GE courses)

GE Notes for our major:
Block A4 satisfied by MATH 2110
Block B2 satisfied by Phys 2100
For BS Biochem only, Block B1 is satisfied by Biol 1100
Careers in the Molecular Sciences - Chemistry and Biochemistry

(FYI – only if there is time!)
Skills you develop as a chemistry or biochemistry major:

- Communication
- Recordkeeping
- Theoretical & practical knowledge
- Critical thinking, Problem solving
- Technical skills
- Operation of scientific equipment
- Information handling & organization
- Safety
- Teamwork

These skills prepare you for a wide variety of career choices, including graduate and professional schools!
For Health Professions, go to the experts for more information!

Pre-Health Professionals:
There is a Health Careers Advisement Office
http://www.calstatela.edu/healthcareers
KH D 1044
healthcareers@calstatela.edu
323-343-5284
Chemistry - the central science

• Chemists develop products to sustain/improve quality of life
  • Careers cross boundaries (biology, physics)
  • Not just bench work -- not working alone!

• Pharmaceutical
• Biotech
• Environment
• Forensics
• Toxicology
• Biomedical Research
• Materials/Polymers
• Education
• Sustainable Energy

http://newellfondamathandscience.blogspot.com/
Careers you may not think of...

- Technical writing
- Science Librarian
- Art restoration
- Cosmetic Industry
- Agriculture/food chemistry
- Consulting
- Intellectual Property Law
- Market Analysis for Investment Firms
- Technical sales and service
What degree are you seeking ultimately -- Bachelor’s? Masters? Ph.D.?

A higher degree means...

• Higher paying jobs, lower unemployment
• Different career options
  • Teaching at a university vs. high school
  • Having a management position or not
• Different responsibilities and rewards
• Will you be paid for getting the degree?
Unemployment among ACS members is low.

In 2013:

**UNEMPLOYMENT** Chemists fare significantly better than the U.S. population but about the same as other college graduates.

Percent unemployment

- U.S. population
- U.S. population, college graduates
- Chemists

**NOTE:** Data are for March each year and exclude those fully retired or otherwise not seeking employment. U.S. population data are for ages 25 and older.

**SOURCES:** Annual ACS salary and employment surveys, Bureau of Labor Statistics.

- Full-time 91.4%
- Unemployed 3.4%
- Part-time 2.7%
- Postdoc 2.4%
What are typical employers?

Industrial Chemistry Careers
• Industrial R&D (develop new technologies) and Production (translates research into scaled up manufacturing process)
• Industrial Sales, Marketing, Technical Service

Academia
• Faculty position (HS, community college, university, etc)
• Support positions (lab technicians, stockroom managers, safety officers)

Government
• National Labs
• Regulatory bodies (EPA, FBI, FDA, ATF)
Choosing a Career…

Find a career that matches your skills, values, and interests!

1. Learn about the Job Market

• American Chemical Society (ACS) Web page, Chemical and Engineering News. Shifting economy; increased Globalization
American Chemical Society website has resources....
American Chemical Society website has resources.

http://www.acs.org/content/acs/en/careers.html
Choosing a Career…

Find a career that matches your skills, values, and interests!

1. Learn about the Job Market (continued)
   - American Society for Biochemistry and Molecular Biology (ASBMB) web page
     http://www.asbmb.org/
ASBMB Website also has resources...

HOW PEOPLE CHOOSE WHAT TO DO NEXT?
We all have points in our career at which we need to make a choice about what to do next. This can happen at any stage – from deciding whether to go to graduate school or find a job in industry, through choosing a postdoctoral position, to deciding what type of position to apply for after completing our scientific training. There are many opportunities to find out all about the academic research career path during graduate school and postdoctoral training – all you have to do is keep your eyes open and talk to the people who are doing it – your mentors and the other researchers you meet along the way (in class, in the department, at meetings etc).

77 THINGS TO DO WITH A BIOCHEMISTRY DEGREE
PH.D. PROGRAMS FOR APSIRING BIOMEDICAL SCIENTISTS
(AAMC)
FIND THE RIGHT GRADUATE PROGRAM AT PHD'S.ORG
NON-TRADITIONAL CAREERS IN SCIENCE
CAREER INSIGHTS - PERSONAL STORIES TOLD BY OTHER LIFE
SCIENTISTS
BECOMING A GRADUATE STUDENT
BECOMING A POSTDOCTORAL FELLOW
BECOMING A FACULTY
RESEARCH POSITIONS AND FELLOWSHIP OPPORTUNITIES
ASBMB JOB BOARD

Exploring Careers in Biochemistry and Molecular Biology
This career brochure is aimed at high school and undergraduate students who may be considering pursuing a degree in biochemistry and molecular biology. Single print copies are available for free upon request. Please email wznap@asmb.org.
Choosing a Career…

Find a career that matches your skills, values, and interests!

1. Learn about the Job Market
   - U. S. Bureau of Labor Statistics, at [www.bls.gov](http://www.bls.gov) has the Occupational Outlook Handbook. For example:

Biochemists and Biophysicists

Summary

Quick Facts: Biochemists and Biophysicists

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<tr>
<td></td>
<td>$81,480 per year</td>
<td>Doctoral or professional degree</td>
<td>None</td>
<td>None</td>
<td>29,200</td>
<td>19% (Faster than average)</td>
<td>5,400</td>
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<td>$39.17 per hour</td>
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What Biochemists and Biophysicists Do

Biochemists and biophysicists study the chemical and physical principles of living things and of biological processes, such as cell development, growth, and heredity.

Work Environment

Biochemists and biophysicists typically work in laboratories and offices to conduct experiments and analyze the results. Most work full time.

How to Become a Biochemist or Biophysicist

Biochemists and biophysicists need a Ph.D. to work in independent research and development. Most Ph.D. holders begin their careers in temporary postdoctoral research positions. Bachelor’s and master’s degree holders qualify for some entry-level positions in biochemistry and biophysics.

Pay

The median annual wage for biochemists and biophysicists was $81,480 in May 2012.
Choosing a Career...

Find a career that matches your skills, values, and interests!

2. What are your strengths and values?
   • Reflect on your education, your skill set
   • It is best to avoid conflicts between your job responsibilities and your values (what you feel is important)
Choosing a Career...

Think about the 6 values shown below, and do your best to rank them by importance (1 is most important)

* **Advancement** (the need for an opportunity for promotion and recognition)
* **Autonomy** (the desire for freedom and ability to be self-directed)
* **Challenge** (the drive to overcome obstacles and solve difficult problems)
* **Security** (the need for stability and predictability)
* **Balance** (the desire for equilibrium between personal and business)
* **Altruism** (the opportunity to contribute to the welfare of others)
Choosing a Career…

Advancement
Autonomy
Challenge
Security
Balance
Altruism

• What does your ranking suggest about the kind of career you would be best working in?
• What does it suggest about the type of employer (large or small; academic or industry?)?
• What does it suggest about the kind of role you might best play (research, management, project leader, other)?
Some other considerations

• What do you like to do? What energizes you?
• Do you want to do lab work/research?
• Where do you want to work?
• What do you want to wear to work?
• How often do you want to change projects?
• What sorts of hours do you want to work?
• Are you willing to travel?
• What sort of funding situation do you want to be in?
• What nonscience interests or skills do you want to use?
• How important is your income level?
• What sort of stress levels do you want to deal with?
• Would you like to work independently or as part of a team?
Choosing a Career…

Do you have the skills to do successfully what you want to do? If not, what is needed?

Can you do a particular job you’re considering? If not, what training or skills do you need to develop?

GET SOME EXPERIENCE:
Work in a research lab; do an internship at a company, volunteer at a hospital, etc.!
Breakout Session # 3

In your group of 3-4, each of you discuss

1. What is your career goal?
2. What motivates you to pursue that goal?
While you are at CSULA, you will discover/confirm what you love to do and what your strengths are.

Combine these with your degree in Chemistry or Biochemistry and pursue a satisfying and rewarding career!

Thanks and good luck!