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LSU Mathematics
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Advice for mathematics majors enrolled in or considering the *actuarial science concentration* and for any LSU students considering being actuaries

Actuary is consistently rated as one of the best jobs in America. In almost every category, such as work environment, employment outlook, job security, growth opportunity, and salary, a career as an actuary is hard to beat.

- paraphrased from www.beanactuary.org

Preparation in actuarial science at the undergraduate level is largely mathematics, statistics, and computer science for the business world and risk management. LSU actuarial science concentration students who did not want to be actuaries have found direct employment or gone into master's degree programs in analytics, statistics, financial engineering, and business.

The Actuarial profession.
Actuaries analyze the costs of risk and uncertainty. They need to learn mathematics, statistics, and finance. It is a small profession—there were about 27,000 jobs for actuaries in 2020. This is small compared to some of the more familiar professions: There are 804,200 lawyers, 3,080,100 registered nurses, and 727,000 physicians. There is a good outlook for growth in the decade 2020-2030 with 24% growth predicted (average growth is predicted at 7%).[1]

Our history is that students who have a good gpa, fulfilled their VEE requirements, passed 3 actuarial exams, and have had an internship, have found entry level actuarial positions. The LSU program includes courses for all VEE requirements and 5 or 6 actuarial exams.

Considering being an actuary?
Being an actuary can be a great profession to enter, but it has to suit your personality, temperament, and work habits. It requires that you are willing to devote many hours to self-study in order to pass a series of rigorous exams. ***By preparing for and taking Exam FM/2 or Exam P/1 early in your program, you can find if you have the temperament to prepare for a long series of exams.*** See #1 and #2 below.
More information on the exam requirements and the profession is available at www.beanactuary.org.

For any LSU student—regardless of their major—who wants to prepare to be an actuary, there is a basic stripped-down core of courses that is the minimum to get started. It

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[1] *Actuaries : Occupational Outlook Handbook*, U.S. Bureau of Labor Statistics, US Department of Labor.

consists of approximately 29 hours of mathematics (1550, 1552, 2057, 2085, and courses for specific exams), 3 hours of accounting (2001), 3 hours of finance (3716), 6 hours of experimental statistics (3201 and 4142), and 3 hours of economics (2030); but some courses in the list have prerequisites and there are many other courses to improve job and advancement prospects.

Advice about the program of study.
1. Take MATH 3050 Interest Theory the fall after MATH 1552. Take Exam FM/2 at the first opportunity after completing MATH 3050. This will likely be in December or February.

You need to devote more time to preparing for Exam FM than just studying for Math 3050. Studying for Exam FM should take about 300 hours. Studying and attending Math 3050 should (in theory) take 15 hours a week or 225 hours total. So if you really devote 15 hours a week to Math 3050, then you should need to devote an additional 75 to exam preparation. If you attempt Exam FM and fail it, it does not matter. You only lost the fee. There is no stigma associated with failing an exam.

2. Take MATH 3355 (Probability) at the earliest opportunity. Take MATH 3355 after completing MATH 1552. You should complete MATH 3355 before the end of your 2nd year and earlier if you enter with advanced placement in Calculus. I recommend taking Exam P at the first opportunity, which is usually within a few weeks of completing MATH 3355.

You need to devote more time to preparing for Exam P than just studying for Math 3355. Studying for Exam P should take about 300 hours. Studying and attending Math 3355 should (in theory) take 9 hours a week or 135 hours total. If you attempt Exam P and fail it, it does not matter. You only lost the fee. There is no stigma associated with failing an exam.

3. Do *not* take MATH 4020 for your capstone requirement. Try to obtain an internship for the summer after your junior year. Use the internship as your capstone course. See the information at:
https://www.math.lsu.edu/~smolinsk/Actuarial%20capstone%20credit.pdf.
You will likely need to have an exam behind you and some programming to have a good application for a summer internship. You may be able to get an internship earlier too.

If you cannot obtain an internship then EXST 4087 will serve as a capstone and contribute your background, knowledge, and possibly an applied statistics minor (see #5 below). If EXST 4087 is not offered, then the Associate Chair of Mathematics has allowed EXST 4025 as a substitute.

4. ECON 2030, ACCT 2001, FIN 3716, and MATH 4056 are part of the credentialing process by the Society of Actuaries (SOA) called *Validation through Educational Experience* (VEE). You must receive a B- or better in each italicized class below to

receive VEE credit from the SOA. The VEE requirements have prerequisites outside of mathematics and are met at LSU in the following sequences:

- o *ECON 2030 or both ECON 2000 and ECON 2010*
- o ACCT 2001 and *FIN 3716 or FIN 3715*
- o *MATH 4056*

You should complete them before you graduate, but you do not have to finish them early in your program. ECON 2030 and ACCT 2001 are prerequisites for FIN 3716, so you must take it first.

5. If you follow the recommended program, then you will have 18-21 hours of free electives in your 120-hour program. You can use them to take courses that interest you, improve your credentials, or improve your knowledge. Here are some suggestions.

- ✓ If you are on track to become an actuary consider the following:
  Highly recommended:
  - o EXST 4142 Introduction to R and Statistical Data Mining (preparation for actuarial exam Exam SRM).
  Recommended:
  - o MATH 4040, 4041, 4045, 4046. Two are required, but all four are recommended. They cover the material for two exams and 90% of a third.
  - o An introduction to programing: CSC 1253 and CSC 1254
  - o An introduction to analytics:
    - ▪ Either CSC 3102 and CSC 3730
    - ▪ or CSC 2730
  - o MATH 4058 Elementary Stochastic Processes

  If you wish to do some independent study for exam preparation, then you may take a MATH 4999 but it must be arranged with the instructor in advance and approved by an advisor as fitting in your schedule.

- ✓ Get a minor in computer science: CSC 1253, CSC 1254, CSC 3102, and CSC 3730 are already recommended courses. The computer science department will upon your request allow you to substitute MATH 2020 for CSC 2259. You will then only need the additional 6 hours of CSC 4101 and CSC 4103.

- ✓ Get a minor in applied statistics: You should already take EXST 2201, EXST 3201, and EXST 4142. You will only need to take EXST 4050 and one of EXST 4025 or EXST 4087 to get a minor in applied statistics. If you cannot obtain an internship for your capstone requirement, then take note that one of these courses may serve as your capstone requirement (see #3).

- ✓ Get a minor in business administration: You should already take ACCT 2001, ECON 2030, and FIN 3715 or FIN 3716. You will need the additional nine hours of ISDS 1100, MGT 3200, and MKT 3401.

6. Participate in the Actuarial Student Association, which is the student professional club. It is your connection to students who have found internships and passed exams and a chance to meet professionals (see the club's website: www.math.lsu.edu/asa).

7. See the advice from LSU alumna, Winnie Sloan, ACAS and recent alumnus Taylor Daigle: Success in the Actuarial Concentration: A College Timeline linked at www.math.lsu.edu/~smolinsk/SuccessInTheActuarialConcentrationSloan&Daigle.pdf.

8. Group projects are a worthwhile for a resume and for a discussion point in an interview. Some ways these may be obtained are:

  o EXST 4142
  o EXST 4087
  o Summer Internship
  o Math 4020

9. Communication skills are important in working as an actuary and obtaining a job as an actuary. Several courses in Communication Studies may be taken to fulfill your general education requirements.

> *Humanities general education courses:*
> > CMST 1061 Fundamentals of Communication
> > CMST 2040 Introduction to Performing Literature
> > CMST 2060 Public Speaking
> > CMST 2063 Argumentation and Debate
> *Social science general education course:*
> > CMST 2010 Interpersonal Communication

Sample programs below based on the 2022-2023 general catalog.

Students on older catalogs may use these sample programs as a guide but need to work with their academic advisor to fulfill the catalog requirements under which they enrolled or may switch to the 2022-2023 catalog. Three samples are given:

1. Program covering 6 exams, VEE requirements, and Pre-Actuarial Foundations Module for pre-actuarial foundations micro-credential.
2. Program including 4 exams, VEE requirements, Pre-Actuarial Foundations Module for pre-actuarial foundations micro-credential, and a computer science minor.
3. Program covering 4 exams, independent study exam prep, VEE requirements, and Pre-Actuarial Foundations Module for pre-actuarial foundations micro-credential. This program is less intensive than 1 and 2.

Notes:
*   denotes courses that satisfy an SOA VEE requirement.
**   denotes courses that prepare for an SOA exam.
*** denotes work outside of class.

Math 4999 is used for internship credit and independent exam study. It is limited to 9 hours total.

1. Program including preparation for 5 exams and SOA modules

Semester 1 (14 or 15 hours)
MATH 1550 (5)
Free elective (3) CSC 1253
ENGL 1001 English Composition (3)
General Education - Natural Science sequence (Biological or Physical Science) part 1
Lab 0-1

Semester 2 (14 or 15 hours)
MATH 1552 (4)
Free elective (3) CSC 1254
MATH 2020 (3)
General Education - Natural Science sequence (Biological or Physical Science) part 2
Lab 1-2

Semester 3 (15 hours)
MATH 2057 (3)
MATH 3050[2],** (5)
EXST 2201 (4)
ENGL 2000 English Composition or approved HNRS courses (3)

Winter break
*Take EXAM FM***

Semester 4 (16 hours)
MATH 3355** (3)
MATH 2085 (3)
ACCT 2001* (3)
ECON 2030* (3) fulfills a General Education 2000-level social science requirement
EXST 3201 (4)

Summer break
*Take EXAM P***

Semester 5 (16 hours)
*Search for internships***
*Visit Olinde Career Center, prepare resume***
MATH 4056* (4)

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[2] A student only has to meet the admission requirements of the College of Science to enroll in a 3000-level course: Earned 24 semester hours; have a 2.0 gpa on both LSU and cumulative averages, and have passed ENGL 1001, all mathematics courses, and all science courses with a grade of "C-" or better.

MATH 4040** or MATH 4045** (3)
FIN 3716 or FIN 3715* (3)
Free elective (3) If you have not passed EXAM P and EXAM FM then use this elective for independent study exam preparation - Math 4999
General Education course - Arts

Semester 6 (15 hours)
MATH 4041** or MATH 4046** (3)
General Education - Natural Sciences (Alternate Science) (3)
Free elective (3) CSC 2730
Free elective (3) Independent study for micro-credential - Math 4999
General Education course – Social Sciences – perhaps one of CMST 1061, 2040, 2060, or 2063 (3)

Summer break
Do summer internship***
Take EXAM ASTAM or EXAM ALTAM***

Semester 7 (13 hours)
Begin job search***
Free elective (3) EXST 4142**
Math elective 2000-level or above (3) MATH 4040** or MATH 4045**
Foreign Language Course (4)
Capstone for internship MATH 4999 or MATH 4997 or EXST 4087 or EXST 4025 or MATH 4020 (3)

Winter break
Take EXAM SRM***

Semester 8 (15 hours)
Free elective (3)
Free elective (3) - Independent study for SOA modules - Math 4999
General Education course - Humanities (English/Honors 2000-level) (3)
General Education course – Humanities (3)
Free elective (3)

Summer
Take EXAM FAM***

2. Program with preparation for 4 exams and computer science minor

Semester 1 (14 or 15 hours)
MATH 1550 (5)
Free elective (3) CSC 1253
ENGL 1001 English Composition (3)

General Education - Natural Science sequence (Biological or Physical Science) part 1(3)
Lab 0-1

Semester 2 (14 or 15 hours)
MATH 1552 (4)
Free elective (3) CSC 1254
MATH 2020 (3) (request substitution for CSC 2259 from computer science department)
General Education - Natural Science sequence (Biological or Physical Science) part 2 (3)
Lab 1-2

Semester 3 (15 hours)
MATH 2057 (3)
MATH 3050[3],[**] (5)
EXST 2201 (4)
ENGL 2000 English Composition or approved HNRS courses (3)

Winter break
Take EXAM FM[***]

Semester 4 (16 hours)
MATH 3355[**] (3)
MATH 2085 (3)
ACCT 2001[*] (3)
ECON 2030[*] (3) (fulfills a General Education 2000-level social science requirement)
EXST 3201 (4)

Summer break
Take EXAM P[***]

Semester 5 (16 hours)
Search for internships[***]
Visit Olinde Career Center, prepare resume[***]
MATH 4040[**] or MATH 4045[**] (3)
MATH 4056[*] (4)
FIN 3716 or FIN 3715[*] (3)
Free elective (3) CSC 3102
General Education course – Arts (3)

Semester 6 (15 hours)
MATH 4041[**] or MATH 4046[**] (3)
General Education - Natural Sciences (Alternate Science) (3)

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[3] A student only has to meet the admission requirements of the College of Science to enroll in a 3000-level course: Earned 24 semester hours; have a 2.0 gpa on both LSU and cumulative averages, and have passed ENGL 1001, all mathematics courses, and all science courses with a grade of "C-" or better.

Free elective (3) CSC 3730
Free elective (3) Independent study for micro-credential - Math 4999
General Education course – Social Sciences (3) (perhaps one of CMST 1061, 2040, 2060, or 2063)

Summer break
Take EXAM ASTAM or EXAM ALTAM[***]
Do summer internship[***]

Semester 7 (16 hours)
Begin job search[***]
Free elective (3) EXST 4142[**]
Free elective (3)
Foreign Language Course (4)
Capstone (3) for internship MATH 4999 or MATH 4997 or EXST 4087 or EXST 4025 or MATH 4020
Free elective (3) CSC 4101

Winter break
Take EXAM SRM [***]

Semester 8 (12 hours)
Math elective - 2000 level or above (3) - MATH 4058
General Education course - Humanities (English/Honors 2000-level) (3)
General Education course – Humanities (3)
Free elective (3) CSC 4103

3. Program covering 4 exams

Semester 1 (14 or 15 hours)
MATH 1550 (5)
Free elective (3) CSC 1253
ENGL 1001 English Composition (3)
General Education - Natural Science sequence (Biological or Physical Science) part 1 (3)
Lab 0-1

Semester 2 (14 or 15 hours)
MATH 1552 (4)
Free elective (3) CSC 1254
MATH 2020 (3)
General Education - Natural Science sequence (Biological or Physical Science) part 2 (3)
Lab 1-2

Semester 3 (15 hours)
MATH 2057 (3)

MATH 3050[4],** (5)
EXST 2201 (4)
ENGL 2000 English Composition or approved HNRS courses (3)

Semester 4 (15 hours)
MATH 3355** (3)
Free elective (2) Independent study to prepare for Exam FM Math 4999
ACCT 2001* (3)
ECON 2030* (fulfills a General Education 2000-level social science requirement)
EXST 3201 (4)

Summer break
*Take EXAM FM****

Semester 5 (15 hours)
*Search for internships****
*Visit Olinde Career Center, prepare resume****
Free elective (2) Independent study to prepare for Exam P Math 4999
MATH 4056* (4)
FIN 3716 or FIN 3715* (3)
Free elective (3) CSC 2730
General Education course – Arts (3)

Winter break
*Take EXAM P****

Semester 6 (15 hours)
Free elective (3) EXST 4142**
General Education - Natural Sciences (Alternate Science) (3)
Free elective (3) CSC 3730
MATH 2085 (3)
General Education course – Social Sciences – perhaps one of CMST 1061, 2040, 2060, or 2063 (3)

Summer break
*Take EXAM SRM now or delay for a semester of further preparation****
*Do summer internship****

Semester 7 (15 hours)
*Begin job search****
Free elective (2) Independent study for Exam SRM (if not yet passed) Math 4999

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[4] A student only has to meet the admission requirements of the College of Science to enroll in a 3000-level course: Earned 24 semester hours; have a 2.0 gpa on both LSU and cumulative averages, and have passed ENGL 1001, all mathematics courses, and all science courses with a grade of "C-" or better.

MATH 4040[**] or MATH 4045[**] (3)
Foreign Language Course (4)
Capstone (3) - for internship MATH 4999 or MATH 4997 or EXST 4087 or EXST 4025
or MATH 4020
Free elective (3) Independent study for micro-credential - Math 4999

<u>Winter break</u>
Take EXAM SRM if not yet passed[***]

<u>Semester 8 (15 hours)</u>
MATH 4041[**] or MATH 4046[**] (3)
Free elective (3)
General Education course - Humanities (English/Honors 2000-level) (3)
General Education course – Humanities (3)
Math elective (3) 2000-level or above Math 4058

<u>Summer</u>
Take EXAM ASTAM or EXAM ALTAM[***]