

Fall 2024 Course announcement: MATH 401: Life Contingencies I,  
MWF 3-3:50, Engineering A 210, Instructor: Dr. Olive

Math 401 webpage: (<http://parker.ad.siu.edu/Olive/M401.html>)

Text: Dickson, D.C.M., Hardy, M.R., and Waters, H.R. (2020), *Actuarial Mathematics for Life Contingent Risks*, 3rd ed., Cambridge University Press, Cambridge, UK. ISBN: 978-1-108-47808-3 (You may also use earlier editions. but the professional exam syllabus has changed so a lot of new material is in the 3rd edition.)

The *prerequisite* for this class is a Calculus based Introduction to Probability such as Math 483. The course covers probability models for insurance and annuities. The 2022-2023 undergraduate catalog has the correct prerequisites, but Math 400 somehow got added as a prerequisite in the current catalogs. I will waive this prereq.

Actuaries put a price on risk, and this course considers actuarial models for life contingencies (life insurance). Life contingency models include life insurance liability calculations, annuities, and credit risk. The course covers basic properties of survival models such as the cdf and pdf as well as the force of mortality (hazard function). Math 401 helps prepare for SOA FAML while Math 402 helps prepare students for the Society of Actuaries (SOA) Exam ALTAM (old MLC and LTAM).

Becoming an actuary is a potential option after you get your degree. You can be hired after receiving a Bachelor's degree and passing (1 or more likely) 2 exams (SOA Exam P = CAS Exam 1P=Probability exam Math 483 or 480, and the FM Exam Math 400 are common). From (<https://www.dwsimpson.com/about/salary-survey/>), in 2020 salary was roughly \$46000-\$56000 for one exam, \$34000-\$72000 for two exams, \$47000-\$87000 for three exams, and \$50000 - \$84000 for 4 exams with less than 1 year of actuarial experience. An ASA (Associate of the Society of Actuaries) makes about \$75000-\$120000 with 1-3 years of experience while an FSA (Fellow of the Associate of Actuaries) makes about \$104000-\$165000 with 3-5 years of experience. See (<http://money.cnn.com/2013/04/25/news/economy/best-job-actuary/index.html>). This course provides some insight on what an actuary does. Useful links are ([www.soa.org](http://www.soa.org)), ([www.casact.org](http://www.casact.org)), ([www.actexamdriver.com](http://www.actexamdriver.com)), (<https://www.coachingactuaries.com>), (<https://www.theinfiniteactuary.com>), and ([www.beanactuary.org](http://www.beanactuary.org)).

Students receive a WF if they stop attending class and fail. An INC is given if for reasons beyond their control, students engaged in *passing* work are unable to complete all class assignments. I sometimes give grades like  $A-$ ,  $B+$ ,  $B-$ , and  $C+$ . 2 homeworks may be turned in one class period late (ie on Monday) with no penalty except the last week of classes. A third late will be accepted with 25% penalty. 2 quizzes may be taken late before the next class period (ie on Friday). At least two sheets of notes are allowed on quizzes, more for exams. A calculator is permitted.

Some other good books: Lorayne and Lucas (2000), *The Memory Book* is useful for **memorization**. Bowers, N.L., Gerber, H.U., Hickman, J.C., Jones, D.A. and Nesbitt, C.J. (1997), *Actuarial Mathematics*, 2nd ed., ACTEX Publications, Winsted, CT.

Camilli, S.J., Duncan, I., and London, R.L. (2014), *Models for Quantifying Risk*, 6th ed. ACTEX Publications, Winsted, CT. ISBN: 978-1625423474

Weishaus, A. (2010), *ASM Study Manual for SOA Exam MLC*, 10th ed., (see [www.studymanuals.com](http://www.studymanuals.com)).

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*Prerequisites:* Math 483

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*email:* dolive@siu.edu *Office hours:* MWThF TBA.

I am also available by appointment and on a walkin basis.

(Cumulative) Final: day TBA, Dec. , time TBA.

The grading and schedule below are tentative. Last day to drop: office on Friday TBA, by internet Sunday TBA

Students receive a WF if they stop attending class and fail. An INC is given if for reasons beyond their control, students engaged in *passing* work are unable to complete all class assignments. One HW may be turned in one class period late with 25% penalty except for the last week of classes.

*Grading:* 1 HW and 1 Quiz will be dropped.

HW	300		Quizzes	100	
exam1	100	exam 2	100	exam 3	100
final	300			total	1000
min. grade	points	min. grade	points	min. grade	points
A	900-1000	B	800-899	C	700-799
D	550-699				

Tentative: cover ch. 1-6, maybe parts of 7 and 18. See the next page.

Week of	MON	WED	FRI
Aug 19	App. A	App. A	prob rev App A
Aug 26	2.1	2.1, Q1	2.1, 2.2, HW1
Sept 2	no class	2.2, 2.3, Q2	2.3, 2.4, HW2
Sept 9	2.4	3.1, Q3	3.1, HW3
Sept 16	3.2	Exam 1	3.3
Sept 23	3.3,	3.4, Q4	3.5, HW4
Sept 30	4.1	4.1, Q5	4.1, HW5
Oct 7	4.1	3.3, Q6	4.1, HW6
Oct 14	4.1	3.3, Q7	3.3,
Oct 21	4.1, 4.2	Exam 2	4.2, HW7
Oct 28	4.3	4.4, Q8	4.4, HW8
Nov 4	4.5	5.1, Q9	5.1, 5.2, HW9
Nov 11	no class	5.2, Q10	5.2, 5.3, HW10
Nov 18	5.3, 5.4, HW11	Exam 3	5.4
Nov 25	no class	no class	no class
Dec 2	5.4	Q11	review

M401 FAML	Dickson 3rd	Dickson 1st	London 6th	London 3rd
Introduction to Life Insurance	1	1	4	NA
Survival Models	2	2	5	3
Life Tables	3	3	6	4
Insurance Benefits	4	4	7	5
Annuities	5	5	8	6
Premium Calculations	6	6	9	7
Policy Values	7	7	NA	NA
Estimating Survival Models	18	NA	5	NA
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M402 ALTAM				
Policy Values	7	7	NA	NA
Multiple State Models	8	8	14	10
Multiple Decrement Models	9	8	13	10
Joint and Last Survivor	10	8	12	9
Pension Mathematics	11	9	NA	NA
Emerging Costs for Trad Ins	13	11	17	NA
Universal Life Insurance	14	NA	16	NA
Emerging Costs for Eq-L Ins	15	12	NA	NA
Embedded Options	17	14	NA	NA
Estimating Survival Models	18	NA	5	NA