

MATH 402 Life Contingencies II Spring 2023 MWF 12:00-12:50 ENGR A, 0222.

*Instructor:* David Olive webpage: (<http://parker.ad.siu.edu/Olive/M402.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 use earlier editions, but the professional exam syllabus has changed so a lot of new material is in the 3rd edition. See [www.addall.com](http://www.addall.com) and [www.amazon.com](http://www.amazon.com).)

The *prerequisite* for this class is Math 401 or equivalent (Life Contingencies I). I will let in students who got a B or higher in Math 483 or Math 480. (5 students did this in 2019 and 3 got A's while 2 got B+'s. I did this with for Math 404 twice where Math 403 was the prereq, and the five Math 483 students got the same grade in Math 404 that they got in Math 483.)

*Office:* (J.W.) Neckers 261 (wing A) *Phone:* (618)-453-6566

*email:* dolive@siu.edu

*Office hours:* MWThF 9:30-10:30, 1:10-1:40

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

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). Life contingency models include life insurance liability calculations, annuities, and credit risk. 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.

Cumulative Final: Friday, May 12, 10:15-12:15.

The grading and syllabus below are tentative. (Drop day in Friday, March 31, with advisor, Sunday, April 2 online. )

*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				

**Still working on this.**

Week of	MON	WED	FRI
Jan 16	no class	rev ch2-5	rev ch2-5
Jan 23	rev ch2-5	10.1,10.2,10.3,10.4, Q1	10.3,10.4, HW1
Jan 30	10.3,10.4	10.3,10.4, Q2	10.3,10.4, HW2
Feb 6	10.3,10.4,9.1	9.2,9.3,9.4, Q3	9.3,9.4, HW3
Feb 13	9.3,	Exam 1	9.3,10.7
Feb 20	10.7,18.4	18.4, Q4	18.4, HW4
Feb 27	18.4	6.3, 6.4, Q5	6.4 HW5
March 6	6.4	6.4, 8.2 Q6	8.2,8.10, HW6
March 13	no class	no class	no class
March 20	8.10,7.2	7.2, Q7	7.2,7.4 HW7
March 27	7.2,7.4,7.3	Exam 2	6.4,7.2
April 3	14.1,14.2	14.2, Q8	14.3, HW8
April 10	15.1	15.2, Q9	15.3, HW9
April 17	16.1	16.1, Q10	16.1, HW10
April 25	16.2,	Exam 3	17.1
May 1	17.1, HW11	17.1, Q11	review

Lorayne and Lucas (2000), *The Memory Book* is useful for **memorization**.

Other references:

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

Cunningham, R.J., Herzog, T.N., and London, R.L. (2008, 2012), *Models for Quantifying Risk*, 3rd and 5th ed. ACTEX Publications, Winsted, CT.

Dickson, D.C.M., Hardy, M.R., and Waters, H.R. (2013), *Actuarial Mathematics for Life Contingent Risks*, 2nd ed., Cambridge University Press, Cambridge, UK.

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

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	10,11	8
Estimating Survival Models	18	NA	5	NA
<hr/>				
M402 ALTAM				
Policy Values	7	7	10,11	8
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