

KO 5001

Organic Chemistry – Reactivity and Structure

Autumn term 2014

Types of sessions and general schedule:

Lectures	K239	Morning: 09:30 – 12:30 // Afternoon: 13:30 – 16:30
Workshops (PODs)	K239	Morning: 09:30 – 12:30 // Afternoon: 13:30 – 16:30
Tutoring (<i>appointment only</i>)	K239	Morning: 09:30 – 12:30 // Afternoon: 13:30 – 18:30
Laboratory exercises (compulsory)	Lab K406	Full day: 09:30 – 18:30 <i>or</i> Afternoon: 13:30 – 18:30

Lecturer:

Abraham Mendoza (AM) 16 24 81 abraham@organ.su.se

Teaching Assistants:

Tamás Görbe (TG) 16 24 86 tgorbe@organ.su.se
Erik Lindstedt (EL) 16 24 67 erikl@organ.su.se

Course literature:

- **[CGW]** Clayden, Greeves & Warren: Organic Chemistry; 2nd Edition, Oxford University Press 2012 (ISBN 978-0-19-927029-3) *or* Clayden, Greeves, Warren & Wothers: Organic Chemistry, Oxford University Press 2001 (ISBN 978-0-19-850346-0)
- **[FSK]** L.D. Field, S. Sternhell, J.R. Kalman: Organic Structures from Spectra, John Wiley & Sons, 4th edition (ISBN 978-0-470-31927-7)
- Handouts from lecturers and assistants

Demands to pass the theory course:

- Passed exam in nomenclature > 50% of the points required
- Passed exam part I (reactions & mechanisms) > 50% of the points required
- Passed exam in spectroscopy theory & analysis > 50% of the points required

Demands to pass the laboratory course:

- Passed exam in nomenclature (30% of the points required)
- Passed exam in safety (100% of the points required)
- Passed all lab reports
- Taken part in lab report writing sessions
- Taken part in lab presentation
- Taken part in lab cleaning

Schedule for KO 5001

Organic Chemistry – Reactivity and Structure

Autumn term 2014

Week 1 [45]

Mon	Nov 3	09.00 – 12.00	Course introduction	AM, EL, TG	K239
			Lecture 0 – Refreshing organic chemistry		
		13.30 – 16.30	Lecture 1 – Chemical bonding and resonance	AM	K239
Wed	5	09.30 – 12.30	Lecture 2 – Thermodynamics and kinetics	AM	K239
		13.30 – 16.30	<i>Tutoring (optional, per appointment)</i>	EL, TG	K239
Thu	6	09.30 – 12.30	Exam: Nomenclature and safety	EL, TG	K239
		13.30 – 16.30	Lecture 3 – Acidity and basicity	AM	K239
Fri	7	09.30 – 10.50	Lecture 4 – Writing reaction mechanisms	AM	K239
		11.00 – 12.30	Lecture 5 – Organometallics and carbonyls	AM	K239
		13.30 – 16.30	POD #0-4	AM	K239

Week 2 [46]

Mon	Nov 10	09.30 – 12.30	Lecture 6 – Carbonyl chemistry I	AM	K239
		13.30 – 18.30	Lab Introduction & <i>resit Exam: Nomenclature and safety</i>	EL, TG	K406
Tue	11	09.30 – 12.30	Lecture 7 – Carbonyl chemistry II	AM	K239
		13.30 – 18.30	Lab 1 – Ketones	EL, TG	K406
Thu	13	09.30 – 12.30	Lecture 8 – Carbonyl chemistry III	AM	K239
		13.30 – 18.30	Lab 2 – Distillation	EL, TG	K406
Fri	14	09.30 – 12.30	Lecture 9 – Carbonyl chemistry IV	AM	K239
		13.30 – 16.30	POD #5-9	AM	K239

Week 3 [47]

Mon	Nov 17	09.30 – 12.30	Lecture 10 – Substitution and elimination	AM	K239
Tue	18	09.30 – 18.30	Lab 3 – Substitution, elimination and addition	EL, TG	K406
Wed	19	09.30 – 12.30	Lecture 11 – Additions to C-C multiple bonds	AM	K239
		13.30 – 18.30	Lab report writing session	EL, TG	K239
Thu	20	09.30 – 18.30	Lab 4 – Grignard addition	EL, TG	K406
Fri	21	09.30 – 12.30	Lecture 12 – Cycloaddition and rearrangements	AM	K239
		13.30 – 16.30	POD #10-12	AM	K239

Week 4 [48]

Mon	Nov 24	09.30 – 18.30	Lab 5 - Condensation	EL, TG	K406
Tue	25	09.30 – 12.30	Lecture 13 – Stereoselective synthesis	AM	K239
Wed	26	09.30 – 12.30	Lecture 14 – Determining organic reaction mechanisms	AM	K239
Thu	27	09.30 – 18.30	Lab 6 - Rearrangements	EL, TG	K406
Fri	28	09.30 – 12.30	Lecture 15 – Designing organic synthesis	AM	K239
		13.30 – 16.30	POD #13-15	AM	K239

Week 5 [49]

Mon	Dec 1	09.30 – 12.30	Lecture 16 – Summary and problem solving	AM	K239
		13.30 – 18.30	Lab 7 – Redox	EL, TG	K406
Tue	2	09.30 – 18.30	Lab 8 – Reactive intermediates	EL, TG	K406
Wed	3	09.30 – 12.00	<i>Tutoring (optional, per appointment)</i>	EL	K239
Thu	4	09.30 – 12.30	POD #1-16	AM	K239
Fri	5	09.30 – 12.30	<i>Tutoring (optional, per appointment)</i>	TG	K239
		13.30 – 16.30	<i>Tutoring (optional, per appointment)</i>	AM	A515

Week 6 [50]

Mon	Dec 8	09.00 – 14.00	Exam: part I	AM, EL, TG	A507
Tue	9	09.30 – 12.30	Lecture 17 – Spectroscopic methods and NMR	AM	K239
		13.30 – 18.30	Lab introduction to separation techniques	EL, TG	K239
Wed	10	09.30 – 12.30	Lecture 18 – Ultraviolet, infrared and mass spectroscopy	AM	K239
		13.30 – 16.30	POD #17-18	AM	K239
Thu	11	09.30 – 12.30	Lecture 19 – NMR I	AM	K239
		13.30 – 18.30	Lab 9 - Separation	EL, TG	K406
Fri	12	09.30 – 18.30	Lab 9 - Separation	EL, TG	K406

Week 7 [51]

Mon	Dec 15	09.30 – 12.30	Lecture 20 – NMR II	AM	K239
		13.30 – 18.30	Lab 9 - Separation	EL, TG	K406
Tue	16	09.30 – 12.30	Lecture 21 – NMR III	AM	K239
		13.30 – 18.30	Lab 9 – Separation	EL, TG	K406
Wed	17	09.30 – 18.30	Lab 9 – Separation	EL, TG	K406
Thu	18	09.30 – 12.30	Lecture 22 – NMR IV	AM	K239
		13.30 – 18.30	Lab cleaning (and extra-time)	EL, TG	K406
Fri	19	09.30 – 12.30	Lecture 23 – Solving spectral problems	AM	K239
		13.30 – 18.30	Lab report writing session	EL, TG	K239

Week 8 [2]

Wed	Jan 7	09.30 – 12.30	POD #19-22	AM	K239
		13.30 – 18.30	Lab report writing session	EL, TG	K239
Thu	8	09.30 – 12.30	Exercise: Techniques to solve spectral problems	EL, TG	K239
		13.30 – 18.30	Lab report writing session	EL, TG	K239
Fri	9	09.30 – 18.30	Lab presentations and reports	EL, TG	K239

Week 9 [3]

Mon	Jan 12	09.30 – 12.30	POD #16-22	AM	K239
Tue	13	09.30 – 12.30	POD #16-22	AM	K239
Wed	14	09.30 – 12.30	<i>Tutoring (optional, per appointment)</i>	EL	K239
Thu	15	09.30 – 12.30	<i>Tutoring (optional, per appointment)</i>	AM	A515
		13.30 – 16.30	<i>Tutoring (optional, per appointment)</i>	TG	K239
Fri	16	09.00 – 14.00	Exam: part II	AM, EL, TG	A507

The **resit exam** for part I and part II is penciled for **Monday, January 26th 2015 (09.00 – 14.00)**. Nevertheless, the time of the exam might be adjusted (within week 5) to match the students' schedule, if appropriately documented.

Appointment is required to participate in the **tutoring sessions** scheduled before exams. Please kindly let the person in charge of the tutoring session know of your intention of attending using the contact information provided. A 12 hour advance notice is strongly recommended.

Note that all the laboratory activities are compulsory.

Recommended reading:

L0	Refreshing organic chemistry	CGW	Ch. 1, 2
L1	Chemical bonding and resonance	CGW	Ch. 4, 7
L2	Thermodynamics and kinetics	CGW	Ch. 13, 12
L3	Acidity/basicity, structure and reactivity	CGW	Ch. 8
L4	Writing reaction mechanisms	CGW	Ch. 5, 39
L5	Organometallics and carbonyls	CGW	Ch. 9
L6	Carbonyl chemistry I: Generalities	CGW	Ch. 6, 9, 10, 23
L7	Carbonyl chemistry II: Enolates and Michael	CGW	Ch. 20, 22, 25
L8	Carbonyl chemistry III: Reversible additions and carboxylic acids	CGW	Ch. 6,10,11,20
L9	Carbonyl chemistry IV: Condensation and olefination	CGW	Ch. 25, 26
L10	Nucleophilic substitution and elimination reactions	CGW	Ch.15, 17, 27
L11	Additions to carbon-carbon multiple bonds	CGW	Ch. 19, 23, 37, 38
L12	Cycloadditions, radicals and rearrangement reactions	CGW	Ch. 34, 35, 36, 37
L13	Stereoselective synthesis	CGW	Ch. 14, 32, 33, 41
L14	Determining organic reaction mechanisms	CGW	Ch. 39
L15	Designing organic synthesis	CGW	Ch. 23, 28
L16	Summary and problem solving	CGW	All above
L17	Introduction to spectroscopic methods and NMR	CGW	Ch. 3, 13, 18
L18	UV/IR/MS	FSK	Ch. 1, 2, 3, 4
L19	NMR I	FSK	Ch. 5
L20	NMR II	FSK	Ch. 5, 6
L21	NMR III	FSK	Ch. 5, 6, 7
L22	NMR IV	FSK	Ch. 5, 6, 7, 8
L23	Solving spectral problems	FSK	Ch. 8, 9