

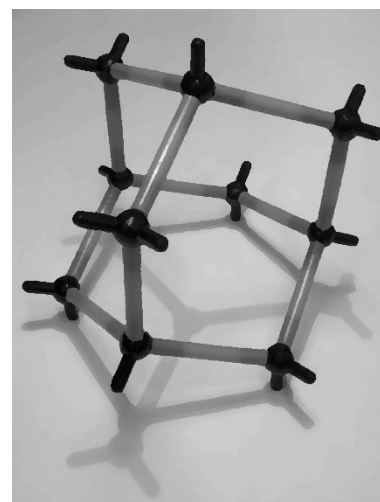
**Course
Guide**

2015/16



CHARLES UNIVERSITY IN PRAGUE

Department of Organic Chemistry



New Synthetic Methods

A Guide to the Course

**Course
Guide**

NEW SYNTHETIC METHODS

A Guide to the Course

Dr. Michael J. Bojdys
Lab: 140 • Tel: +420221951332
E-mail: bojdys@natur.cuni.cz

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Outline of the Course

This course is subdivided into two parts “New Synthetic Methods” and their applications in “Medicinal Chemistry”.

New Synthetic Methods (12 lectures)

This course aims to add to your range and understanding of important chemical reactions used in modern synthetic chemistry, with an emphasis on how they can control the stereochemistry, regioselectivity and chemoselectivity. The course begins by looking at pericyclic reactions and the organic chemistry of some p-block elements and then moves on to the use of organometallics in synthesis.

Topics Pericyclic reactions and the Woodward–Hoffmann rules: why are pericyclic reactions selective?

The use of p-block elements in organic synthesis

Organometallics in synthesis. Reactivity and selectivity of organometallic reagents and how this is related to structure and mechanism. The chemistry of various transition metals will be discussed.

Topics will include, Ru, Mo, and Ti alkylidene carbene compounds for metathesis; Pd in organic synthesis, the Heck, Suzuki, Stille and Sonogashira cross-coupling reactions and the formation of carbon-heteroatom bonds mediated by Pd; other transition metals.

Recommended books

Organic Chemistry, Clayden, Greeves, Warren and Wothers, OUP, 2001, Chapter 48.

Pericyclic Reactions, Fleming, I., Oxford Chemistry Primer 67, OUP, 1998.

Frontier orbitals and organic chemical reactions. Fleming, I, Wiley, 1976.

Principles and applications of organotransition metal chemistry (2nd ed), Collman, J.P., Hegedus, L.S., Mill Valley, 1987.

New Synthetic Methods in Medicinal Chemistry (12 lectures)

The pharmaceutical industry is one of the major employers of organic chemistry graduates in discovery, development and production. This course gives an overview of the type of reactions often used in medicinal and process chemistry and some case histories of modern drugs. It will apply all previous organic chemistry courses to this very important topic, whilst introducing a wide range of new reactions, mainly (though not exclusively) concerning heterocycle formation. It is an organic chemistry course with a strong focus on reaction mechanisms and no prior knowledge of biochemistry is required.

Topics The background and history of modern medicinal chemistry will be given as a context for the course. The drug discovery process will also be discussed: how do drugs go from the chemist's bench to being multi-million dollar earners?

Modern heterocyclic chemistry: most drugs contain heterocyclic rings and the structure, synthesis and reactions of both aromatic and non-aromatic heterocycles will be described, within the context of drugs for the treatment of many disease areas e.g. ulcers, bacterial and viral infections, influenza and malaria.

Recommended Books

Organic Chemistry, Clayden, Greeves, Warren and Wothers, OUP, 2001, Chapter 43 and 44.
Aromatic Heterocyclic Chemistry, Davies, D.T., Oxford Chemistry Primers, OUP, 1991.
Top Drugs, Top Synthetic Routes, Saunders, J. Oxford Chemistry Primers, OUP, 2000.
The Chemistry of Heterocycles: Structure, Reactions, Synthesis and Applications, Eicher, T. and Hauptmann, S., Wiley-VCH, 2003.
Heterocyclic Chemistry at a Glance, Joule, J.A. and Mills, K., Blackwell Publishing, 2007.

Supervision and Homework

Each lecture course is accompanied by a problems sheet from which your supervisor will ask you to complete a number of questions. You may also be set additional questions, perhaps from past examination papers. For each supervision you should expect to prepare some written work, to hand it in for marking in advance of the supervision and to receive it back, marked and with written comments from your supervisor, within a reasonable time (usually by the end of the week).

Examination

The examination consists of a one three-hour written paper that contains (up to) seven questions; candidates must answer five questions, which will carry equal weight.

You will be provided with a Data Book which contains a simple Periodic Table, values of physical constants, certain mathematical formulae and selected character tables. You will be provided with a copy of the Data Book when you appear for the examination. You are permitted to bring unassembled molecular models into the examination. No other reference material is permitted during the examination.

There are three possible dates for the examination on offer, which are as follows:
16.05.2016 (Mon),
18.05.2016 (Wed),
20.05.2016 (Fri) from 09:00 - 12:10.

Students may choose to abstain from one examination up to 24 h before the set date, and only on account of a certified medical emergency or other grievous circumstances. If all three dates are missed the course is considered as failed without further ado.

The following class boundaries will be used for all the examination:

- candidates who achieve a percentage mark of 80.0-100.0 are awarded a 1st class
 - candidates who achieve a percentage mark of 60.0-79.9 are awarded a 2nd class
 - candidates who achieve a percentage mark of 50.0-59.9 are awarded a 3rd class
 - candidates who achieve a percentage mark of 0.0-49.9 fail the exam.
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New Synthetic Methods - Teaching schedule 2015/16

All lectures will be held 10:00 to 12:00 in seminar room 138, Department of Organic Chemistry

Summer Term			
1	15-Feb	Mo	NSM1
	16-Feb	Tu	
	17-Feb	We	
	18-Feb	Th	
	19-Feb	Fr	
	20-Feb	Sa	
	21-Feb	Su	
2	22-Feb	Mo	NSM1
	23-Feb	Tu	
	24-Feb	We	
	25-Feb	Th	
	26-Feb	Fr	
	27-Feb	Sa	
	28-Feb	Su	
3	29-Feb	Mo	NSM1
	01-Mar	Tu	
	02-Mar	We	
	03-Mar	Th	
	04-Mar	Fr	
	05-Mar	Sa	
	06-Mar	Su	
4	07-Mar	Mo	NSM2
	08-Mar	Tu	
	09-Mar	We	
	10-Mar	Th	
	11-Mar	Fr	
	12-Mar	Sa	
	13-Mar	Su	
5	14-Mar	Mo	NSM2
	15-Mar	Tu	
	16-Mar	We	
	17-Mar	Th	
	18-Mar	Fr	
	19-Mar	Sa	
	20-Mar	Su	
6	21-Mar	Mo	NSM2
	22-Mar	Tu	
	23-Mar	We	
	24-Mar	Th	
	25-Mar	Fr	
	26-Mar	Sa	
	27-Mar	Su	

Summer Term			
7	28-Mar	Mo	NSM3
	29-Mar	Tu	
	30-Mar	We	
	31-Mar	Th	
	01-Apr	Fr	
	02-Apr	Sa	
	03-Apr	Su	
8	04-Apr	Mo	NSM3
	05-Apr	Tu	
	06-Apr	We	
	07-Apr	Th	
	08-Apr	Fr	
	09-Apr	Sa	
	10-Apr	Su	
9	11-Apr	Mo	NSM3
	12-Apr	Tu	
	13-Apr	We	
	14-Apr	Th	
	15-Apr	Fr	
	16-Apr	Sa	
	17-Apr	Su	
10	18-Apr	Mo	NSM4
	19-Apr	Tu	
	20-Apr	We	
	21-Apr	Th	
	22-Apr	Fr	
	23-Apr	Sa	
	24-Apr	Su	
11	25-Apr	Mo	NSM4
	26-Apr	Tu	
	27-Apr	We	
	28-Apr	Th	
	29-Apr	Fr	
	30-Apr	Sa	
	01-May	Su	
12	02-May	Mo	NSM4
	03-May	Tu	
	04-May	We	
	05-May	Th	
	06-May	Fr	
	07-May	Sa	
	08-May	Su	

Summer Term			
13	09-May	Mo	
	10-May	Tu	
	11-May	We	
	12-May	Th	
	13-May	Fr	
	14-May	Sa	
	15-May	Su	
14	16-May	Mo	Exam 1/3
	17-May	Tu	
	18-May	We	Exam 2/3
	19-May	Th	
	20-May	Fr	Exam 3/3
	21-May	Sa	
	22-May	Su	

Note:

There are three possible dates for the examination on offer towards the end of the term. Students may choose to **abstain from any one examination up to 24 h before the set date**, and only on account of a certified medical emergency or other grievous circumstances. **If all three dates are missed the course is considered as failed without further ado.**

