PROGRAMME OF COURSES
2023/24

Complete name of the course: Name Reaction in Organic Chemistry

Name of the Programme: Pharmacy, full time training

Abbreviated name of the course: Name Reaction

English name of the course: Name Reaction

German name of the course: -

Classification: Natural science

Neptun Codes: GYSSZK207E1A

Subject classification: optional

Institute: Semmelweis University, Department of Organic Chemistry

Name of the tutor/lecturer: Andrea Czompa, Dr. **Contacts** **Phone:** +36-1-476-3600/53035 **E-Mail** czompa.andrea@pharma.semmelweis-univ.hu	**Academic degree:** Ph. D. Assistant Professor
Further tutors: Andrea Czompa, Dr., Ph.D.	**Academic degree:** Assistant Professor
Number of lectures /week: 2 lectures	**Credit points:** 2

Brief course summary:

Description of the most important name reactions used in organic chemistry and discussion of their mechanism. The use of rules, synthetic methods/modells, name reactions found in literature and modifications of it in order to prepare different compounds, like drugs or candidates. Detailed analysis of enzymatic-, chemo-, regio- and enentioselective synthesis, flow chemistry, microwave reactions, one-pot, tandem and domino synthetic pathways.

Course data

Recommended semester of completing the course	Lecture (contact hrs)	Practice (contact hrs)	Seminar (contact hrs)	Individual lecture	Total number of contact hours/semester	Semester	Consultation
4.	28	-	-	-	28 (lectures)	Spring semester * Winter semester * Both semesters*	**2**

I. Lecture topics/week

1. week: Acyloin condensation, aldol addition and condensation, Appel reaction, Arndt-Eistert synthesis, azo-coupling, Baeyer-Villiger oxidation, Baldwin's rules, Bamberger rearrengement, Morita-Baylis-Hillman reaction, Beckmann rearrengement, Béchamp reduction, Benzoin condensation, Biginelli reaction, Bischler-Napieralski cyclization, Bucherer and Bucherer-Bergs reaction, Bucherer carbazole synthesis, Buchwald-Hartwig cross-coupling, CIP rules.

2. week: Cannizzaro disproportionation, Chan-Lam cross-coupling, Chargaff rules, Chichibabin reaction, Claisen condensation, Clemmensen reduction, Collins oxidation, Corey-Kim oxidation, Coumarin synthesis, Simonis Chromone synthesis, Criegee rearrengement, Curtius rearrengement, Darapsky degradation, Harger reaction, Darzens-Claisen reaction, Dakin and Dess-Martin oxidation, Dakin-West reaction, Delépine reaction, Diastereoselective addition, diazotation, Dieckmann condensation, Diels-Alder and retro Diels-Alder reaction, Directed o-metalation, Dimroth rearrengement.

3. week: Edman degradation, Alder-ene reaction, Erlenmeyer-Plöchl reaction, Meerwein-Eschenmoser-Claisen reaction Eschweiler-Clarke reaction, Evans-aldol reaction, Fehling reagent, Feist-Bénary synthesis, Fischer-Bartholomaus and Orth reaction, Fischer glycosilation, Fischer purine synthesis, Fisher-Speier esterification, Fischer indole synthesis, Friedel-Crafts acylation and alkylation, Friedlander synthesis, Fries-Finck rearrengement, Fritsch-Buttenberg-Wiechell rearrengement, Fujimoto-Belleau reaction.

4. week: Gabriel synthesis, Gabriel-Colman rearrengement, Gattermann amd Gattermann-Koch reaction, Gewald reaction, Gould-Jacobs reaction, Grignard reagents and reaction, Heck and amino-Heck reaction, Heck oxyarylation, Hantzsch dihydropyridine and pyrrole synthesis, Hell-Volhard-Zelinsky reaction, Henry-Kamlet reaction, Heumann's indigo synthesis, Hinsberg oxindole, oxiquinoline, szulfone and thiophene synthesis, Hinsberg test.

5. week: Hofmann elimination and rearrengement, Houben-Hoesch reaction, Houben-Fischer synthesis, Azide-alkyne and Huisgen cycloaddition, Click chemistry, Hunsdiecker-Borodin reaction, Indophenin reaction, Ireland-Claisen rear-rengement, Ivanov reaction, Herzig-Jacobsen rearrengement, Jacobsen-Katsuki epoxidation, Japp-Klingemann reaction, Jones oxidation, Jourdan-Ullmann-Goldberg synthesis, Johnson-Claisen rearrengement, Julia olefination and modified Julia reaction.

6. week: Kabachnik-Fields reaction, Kharasch-Sosnovsky reaction, Kiliani-Fischer synthesis, Knoevenagel condensation, Knorr pyrazole, pyrrole and quinoline synthesis, Koenigs-Knorr glycosylation, Kolbe electrolytic synthesis and nitrile synthesis, Kolbe-Schmitt reaction, Kostanecki acylation, Krebs-cycle, Kröhnke pyridine synthesis, Kumada cross-coupling, Larock indole synthesis, Lehmstedt-Tanasescu reaction, Leuckart-Wallach reaction.

7. week: Lieben Haloform reaction, Lössen rearrengement, Luche reduction, Maillard reaction, Malaprade oxidation, Malonic ester synthesis, Mannich reaction, Milas *cis*-hydroxylation, McMurry olefination, Meerwein-Ponndorf-Verley reduction, Merck synthesis, Meyer-Schuster (Rupe) rearrengement, Michael reaction, Mitsunobu reaction, Mukaiyama aldol reaction, Mutarotation and anomeric effect.

8. week: Nef reaction, Negishi coupling, Nenitzescu indole synthesis, Nicholas reaction, Nierenstein reaction, Ninhydrin reaction, Nozari-Hiyama-Kishi reaction, Oppenauer oxidation, Osazone snythesis, Overman and Oxy-Cope rearrengement, Paal-Knorr furane, pyrrole and thiophene synthesis, Passerini reaction.

9. week: Pauson-Khand reaction, Pechmann condensation, Pericyclic reactions, Perkin reaction and synthesis, Petasis reaction, Peterson olefination and elimination, Pfitzinger reaction, PTC, Pictet-Gams isoquinoline synthesis, Pictet-Spengler reaction, Pinacol coupling and rearrengement, PCR.

10. week: Pomeranz-Fritsch reaction, Povarov reaction, Prévost *trans*-hydroxylation, Prilezhaev reaction, Prins and retro-Prins reaction, Ramachandram Plot, Reformatsky and Blaise reaction, Reimer-Tiemann reaction, Reppe reaction, Ritter reaction, Robinson annulation and Allan-Robinson reaction, Robinson- and Robinson-Gabriel

synthesis, Fischer-Rosanoff convention, Rosenmund reduction, Rosenmund-von Braun reaction, Rubottom oxidation, Ruff degradation.

11. week: Hosomi-Sakurai allylation, Sandmeyer reaction, Saponification, Balz-Schiemann reaction, Schmidt rearrengement, Scholl reaction, Schotten-Baumann reaction, Sharpless and Shi epoxidation, Simmons-Smith reaction, Skraup reaction and Skraup-Doebner-von Miller modification, Sommelet reaction, Sonogashira coupling, Staudinger reduction, Michael-Stetter reaction, Stille coupling, Stobbe condensation, Stollé and Stolz synthesis.

12. week: Strecker amino acid synthesis, Suzuki-Miyaura coupling, Moffatt-Swern and Fleming-Tamao-Kumada oxidation, Tiffeneau-Demjanov rearrengement, Tischenko reaction, aldol-Tischenko and Evans-Tischenko reaction, Tollens reagent, Torgov synthesis, Traube guanine, purine, theobromine and theophylline synthesis, Tschitschibabin pyridine synthesis, Tsuji-Trost reaction, Ugi reaction, Ullmann coupling, Upjohn dihydroxylation.

13. week: Van Leusen imidazole and oxazole synthesis, Van Leusen reaction, Van Slyke method, Vilsmeier-Haack reaction, A-, B1-, B2-, B3-, B5-, B6-, B7-, B9-, B12-, C-, D-, E-Vitamine snythesis, von Braun reaction and Amide degradation, Wacker-Tsuji oxidation, Walden inversion, Wagner-Meerwein and Wallach rearremgement, Weerman degradation, Weinreb-Nahm ketone synthesis, Wharton reaction, Williamson ether synthesis, Wittig reaction.

14. week: Horner-Wadsworth-Emmons reaction, Wohl degradation, Wolff rearrengement, Wolff-Kishner reduction and Huang-Minlon modification, Woodward *cis*-hydroxylation, Würtz coupling, Würtz-Fittig reaction, Yamaguchi esterification, Zemplén deacetylation, Thorpe-Ziegler reaction, Zincke reaction and nitration, Zincke-Suhl reaction, Zinin reaction.

Course requirements

Order of consultations:
at a pre-arranged time.

Prerequisites:
GYKSZK123E1A

Semester acceptation conditions: (*successful course attendance, mid-term tests, absence, etc*.)
The lectures are obligatory. Max. 4 absences are allowed. There is a little practice at the end of each lecture.
If necessary, students may ask consultation at a proper time after preliminary agreement with the teacher at the end of the semester.

Knowledge testing during the semester: -

Requirements of the signature at the end of the semester:
course attendance.

Individual activity of the student during the semester *(protocol, etc.):* -

Performance control in the examination period (*final, semi-final*):
Those who send the written part of the exam will receive a signature.
Students, who have got signature for the semester can go for oral exams.
The examinations are evaluated by a mark 1-5 (5 is the best).
Unsuccessful exams may be repeated not more than 1 times.

Performance control in the examination period (*written, oral, written and oral*):
written and oral exams.

Prescribed external practice: -

List of teaching materials: (List of textbooks, hand-outs, scripts, etc.)

1. László Kürthy and Barbara Czakó: *Strategic Applications of Named Reactions in Organic Synthesis*, Elsevier Academic Press, 2005.
2. Bradford P. Mundy, Michael G. Ellerd, Frank G. Favaloro Jr.: *Name Reactions and Reagents in Organic Synthesis*, Second Edition, John Wiley & Sons, 2005.
3. Smith M. B., March J. *Advanced Organic Chemistry: Reactions, Mechanisms and Structure*, 6th Edition, New York, Wiley-Interscience, 2007.
4. Jie Jack Li: *Name Reactions*, Fifth Edition, Springer International Publishing, 2014.
5. http://www.name-reaction.com/
6. https://www.organic-chemistry.org/namedreactions/
7. https://en.wikipedia.org/wiki/List_of_organic_reactions
8. https://www.elsevier.com/solutions/reaxys/who-we-serve/reactionflash

List of course materials: -

Scientific, course related researches, publications/essays: -

The course description was prepared by:

Andrea Czompa Dr., PhD.