

### COURSE RECORD

|                                 |  |
|---------------------------------|--|
| Code                            | <b>BENG 552</b>  |
| Name                            | <b>Natural Product Discovery and Biosynthesis</b>  |
| Hour per week                   | 3+0 (Theory + Practice)  |
| Credit                          | 3  |
| ECTS                            | 7.5  |
| Level/Year                      | Graduate   |
| Semester                        | -  |
| Type                            | Elective   |
| Location                        |  |
| Prerequisites                   | None   |
| Special Conditions              |  |
| Coordinator(s)                  | Özkan Fidan PhD  |
| Webpage                         |  |
| Content                         | This course presents the natural products discovery and their biosynthesis. It covers various natural products discovery strategies including genome mining, strain engineering, combinatorial biosynthesis, metagenomics, co-cultivation, cell-free systems and traditional approach. It also provides a brief introduction to drug development process. Students are expected to have a term project regarding the biosynthesis/discovery of natural products. |
| Objectives                      | -Describe the natural products as drugs and their biosynthesis<br>-Identify various natural product discovery methods<br>-Define the drug development process<br>-Develop a strategy for the discovery/biosynthesis of natural products  |
| Learning Outcomes               | By the end of this course, students will be able to:<br>L01: understand natural product biosynthesis<br>L02: gain insights about traditional and current natural product discovery techniques<br>L03: have fundamental knowledge in drug development process<br>L04: acquire skills in working with others as a member of team<br>L05: demonstrate ability to conduct literature review and design the strategy to solve real problems                           |
| Requirements                    |  |
| Reading List                    | Textbooks: "Natural product chemistry for drug discovery", Antony D. Buss and Mark S. Butler, 2010, RSC Publishing<br>"Natural product chemistry at a glance", Stephen P. Stanforth, 2006, Blackwell Publishing<br>Recent review articles and research publications on the natural product discovery from literature   |
| Ethical Rules and Course Policy | Cell phones should be turned off or muted during the class.  |

### LEARNING ACTIVITIES

| Activities    | Number | Weight (%) |
|---------------|--------|------------|
| Lecture       | 14     | 50%        |
| Term project  | 7      | 35%        |
| Presentations | 4      | 15%        |
|               | Total  | 100        |

### ASSESSMENT

| Evaluation Criteria        | Weight (%) |
|----------------------------|------------|
| Midterm                    | 25%        |
| Term Project Report        | 25%        |
| Term Project Presentations | 20%        |

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|                       |      |
|-----------------------|------|
| Final Exam/Submission | 30%  |
| Total                 | 100% |

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For a detailed description of grading policy and scale, please refer to the website <https://goo.gl/HbPM2y> section 28.

### COURSE LOAD

| Activity                  | Duration<br>(hour) | Quantity | Work Load<br>(hour) |
|---------------------------|--------------------|----------|---------------------|
| In class activities       | 3                  | 16       | 48                  |
| Term project              | 4                  | 8        | 32                  |
| Research (web, library)   | 3                  | 15       | 45                  |
| Required Readings         | 2                  | 15       | 30                  |
| Pre-work for Presentation | 5                  | 5        | 25                  |
| Exams                     | 15                 | 2        | 30                  |
| <b>General Sum</b>        |                    |          | <b>210</b>          |

ECTS: 7,5 (Work Load/25-30)

### CONTRIBUTION TO PROGRAMME OUTCOMES\*

|     | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| L01 | 5   | 5   | 5   | 5   | 5   | 4   | 4   | 5   |
| L02 | 5   | 5   | 5   | 5   | 5   | 4   | 4   | 5   |
| L03 | 5   | 5   | 5   | 5   | 5   | 4   | 4   | 5   |
| L04 | 5   | 5   | 5   | 5   | 5   | 4   | 4   | 5   |

\* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

### WEEKLY SCHEDULE

| W  | Topic  | Outcomes                |
|----|--|-------------------------|
| 1  | Introduction to natural products<br>Activity: Lecture presentation   | L01                     |
| 2  | Sources of natural products<br>Activity: Lecture presentation  | L01                     |
| 3  | Differences between natural products and synthetics<br>Activity: Lecture presentation  | L01                     |
| 4  | Natural product discovery: Traditional approach<br>Activity: Lecture presentation and literature readings, term project proposal | L01, L02, L04, L05      |
| 5  | Natural product discovery: Genome mining<br>Activity: Lecture presentation and literature readings                               | L01, L02, L04, L05      |
| 6  | Natural product discovery: Strain engineering<br>Activity: Lecture presentation and literature readings                          | L01, L02, L04, L05      |
| 7  | Natural product discovery: Combinatorial biosynthesis<br>Activity: Lecture presentation and literature readings                  | L01, L02, L04, L05, L05 |
| 8  | Natural product discovery: Co-cultivation<br>Activity: Lecture presentation and literature readings                              | L01, L02, L04, L05      |
| 9  | Midterm<br>Activity: Discussion on term project progress   | L01, L02, L04, L05      |
| 10 | Natural product discovery: Metagenomics<br>Activity: Lecture presentation and literature readings                                | L01, L02, L04, L05      |
| 11 | Natural product discovery: Cell-free systems<br>Activity: Lecture presentation and literature readings                           | L01, L02, L04, L05      |
| 12 | Drug development<br>Activity: Lecture presentation, term project report submission   | L04                     |
| 13 | Student presentations<br>Activity: Term project presentations  | L01, L02, L04, L05      |
| 14 | Student presentations<br>Activity: Term project presentations  | L01, L02, L04, L05      |

Prepared by Dr. Özkan Fidan  
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