**Academic year 2020-2021**

# Structural & Multidisciplinary Optimization

**Prof. P. Tossings & P. Duysinx**

| | | | Group A (1/94 Montefiore) | Group B (EMSHIP) (1/126) |
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| **1** | 09-15 | 13:45<br><br>14:30 | General Presentation of the Course (Patricia Tossings)<br>Fundamentals of Mathematical Programming including KKT conditions (Patricia Tossings) | General Presentation of the Course (Pierre Duysinx)<br>Introduction to Optimization In Engineering Design (Pierre Duysinx) |
| **2** | 09-22 | 13:45 | Introduction to Optimization In Engineering Design<br>Fundamentals of Structural Optimization<br>(Pierre Duysinx) | Fundamentals of Mathematical Programming including KKT conditions (Patricia Tossings) |
| **3** | 09-29 | 13:45 | Unconstrained Optimization: Gradient Methods – Adaptation to quasi-unconstrained optimization ((Patricia Tossings) | Elementary Concepts in structural Optimization. Tests Problems. (Pierre Duysinx)<br>Finite Element and Optimization (Pierre Duysinx) |
| **4** | 10-06 | 13:45 | Elementary Concepts in structural Optimization. Tests Problems. (Pierre Duysinx)<br>Finite Element and Optimization (Pierre Duysinx) | Unconstrained Optimization: Gradient Methods – Adaptation to quasi-unconstrained optimization (Patricia Tossings) |
| **5** | 10-13 | 13:45 | Line Search Methods (Patricia Tossings) | Optimality Criteria (Pierre Duysinx) |
| | | 15:45 | **Project 1: Unconstrained Optimization** | **Project 1: Unconstrained Optimization** |
| | | | **Introduction to MATLAB** | **Introduction to MATLAB** |
| **6** | 10-20 | 13:45 | Optimality Criteria (Pierre Duysinx) | Line Search Methods (Patricia Tossings) |
| | | 15:45 | **Personal Project 2: Optimality criteria for truss structures** | **Homework 2: Optimality criteria for truss structures** |
| | | | Supervised work | Supervised work |
| **7** | 10-27 | 13:45 | Unconstrained optimization: Newton, Newton-like and quasi-Newton Methods (Patricia Tossings) | From OC to Sequential Convex Programming. Structural Approximations (Pierre Duysinx) |
| | | 15:45 | Supervised work | Supervised work |
| | 11-03 | | **AUTOMN BREAK** | |
| **8** | 11-10 | 13:45 | From OC to Sequential Convex Programming. Structural Approximations (Pierre Duysinx) | Unconstrained optimization: Newton, Newton-like and quasi-Newton Methods (Patricia Tossings) |
| | | 15:45 | Supervised work | Supervised work |
| **9** | 11-17 | 13:45 | General Constrained Optimization: Duality (Patricia Tossings) | Introduction to topology optimization (Pierre Duysinx) |
| | | 15:45 | | Supervised work |
| | | 23:59 | **Deadline Project 1** - Unconstrained Optimization | **Deadline Project 1** - Unconstrained Optimization |

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| **10** | 11-24 | 13:45 | Introduction to topology optimization (Pierre Duysinx) | General Constrained Optimization: Duality (Patricia Tossings) |
| | | 15:45 | **Computer Project 3: Topology optimization using 99-line code** | **Computer Work 3: Topology optimization using 99-line code** |
| | | | Supervised work | |
| **11** | 12-01 | 13:45 | General Constrained Optimization: penalty and barrier functions, augmented Lagrangian, SLP, SQP, *etc.* *(Patricia Tossings)* | Sensitivity Analysis (Pierre Duysinx) |
| | | 15:45 | Supervised work | Supervised work |
| | 12-04 | 23:59 | **Deadline Project 2** – Optimality Criteria | **Deadline Homework 2** – Optimality Criteria |
| **12** | 12-08 | 13:45 | Sensitivity Analysis (Pierre Duysinx) | General Constrained Optimization: penalty and barrier functions, augmented Lagrangian, SLP, SQP, *etc.* *(Patricia Tossings)* |
| | | 15:45 | Supervised work | Supervised work |
| **13** | 12-15 | 13:45 | Introduction to Shape Optimization (Pierre Duysinx) | Q&A (Patricia Tossings) Supervised work |
| | | 15:45 | Q&A (Patricia Tossings) Supervised work | Introduction to Shape Optimization (Pierre Duysinx) |
| | **12-19** | | **WINTER BREAK** | |
| | **01-03** | **23:30** | **Deadline Project 3** - Topology Optimization | **Deadline Project 3** - Topology Optimization |

PS/ Students have to attend at least 60% of the supervised computer work sessions.