

---

**Modulbezeichnung:** **Magnetic Resonance Imaging sequence programming (MRIpulseq)** **5 ECTS**  
 (Magnetic Resonance Imaging sequence programming)

Modulverantwortliche/r: Moritz Zaiß  
 Lehrende: Andreas Maier, Moritz Zaiß

---

Startsemester: SS 2021	Dauer: 1 Semester	Turnus: halbjährlich (WS+SS)
Präsenzzeit: 60 Std.	Eigenstudium: 90 Std.	Sprache: Englisch

---

**Lehrveranstaltungen:**

Magnetic Resonance Imaging sequence programming (SS 2021, Seminar, Andreas Maier et al.)

---

**Empfohlene Voraussetzungen:**

The prerequisite for the exercise is knowledge of the Magnetic Resonance Imaging 1 [MRI1] lecture by Prof. Dr. Laun. For more information, please contact: moritz.zaiss@uk-erlangen. Registration via Studon: <https://www.studon.fau.de/crs2819947.html>

---

**Inhalt:**

In this two-week block seminar, the basics of MR sequence programming are taught. Basic sequences such as FID, spin echo, and gradient echo are programmed in Python by the students themselves in this exercise. In addition, the basic image reconstruction based on the simulated and recorded data is written and carried out in Python, including radial imaging and iterative reconstruction. The sequences are created in a format that can be interpreted directly by MR scanners (<https://pulseq.github.io>). Part of the exercise will therefore be to use the created sequences on a real MRT machine in the Center for Medical Physics and Technology Generate signals from objects and test persons and reconstruct them into MRI images. Basic knowledge of Python is helpful, but can also be acquired in the exercise. The prerequisite for the exercise is knowledge of the Magnetic Resonance Imaging 1 [MRI1] lecture by Prof. Dr. Laun. For participation in the seminar, including an exercise with written report and demonstration in the following week, a total of 5 ECTS points with grade are given.

**Lernziele und Kompetenzen:**

Students can create sequences in a format that can be interpreted directly by MR scanners (<https://pulseq.github.io>). In the exercise, they will use the created sequences on a real MRT machine in the Center for Medical Physics and Technology, generate signals from objects and test persons and reconstruct them into MRI images.

**Literatur:**

<https://pulseq.github.io>

---

**Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:**

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

**[1] Medizintechnik (Master of Science)**

(Po-Vers. 2013 | TechFak | Medizintechnik (Master of Science) | Studienrichtung Medizinische Bild- und Datenverarbeitung | M5 Medizintechnische Vertiefungsmodule (BDV) | Magnetic Resonance Imaging sequence programming)

**[2] Medizintechnik (Master of Science)**

(Po-Vers. 2013 | TechFak | Medizintechnik (Master of Science) | Studienrichtung Medizinelektronik | M5 Medizintechnische Vertiefungsmodule (MEL) | Magnetic Resonance Imaging sequence programming)

**[3] Medizintechnik (Master of Science)**

(Po-Vers. 2018w | TechFak | Medizintechnik (Master of Science) | Studienrichtung Medizinische Bild- und Datenverarbeitung | M5 Medizintechnische Vertiefungsmodule (BDV) | Magnetic Resonance Imaging sequence programming)

**[4] Medizintechnik (Master of Science)**

(Po-Vers. 2018w | TechFak | Medizintechnik (Master of Science) | Studienrichtung Medizinelektronik | M5 Medizintechnische Vertiefungsmodule (MEL) | Magnetic Resonance Imaging sequence programming)

**[5] Medizintechnik (Master of Science)**

(Po-Vers. 2019w | TechFak | Medizintechnik (Master of Science) | Modulgruppen M1, M2, M3, M5, M7 nach Studienrichtungen | Studienrichtung Medizinische Bild- und Datenverarbeitung | M5 Medizintechnische Vertiefungsmodule (BDV) | Magnetic Resonance Imaging sequence programming)

fungensmodule (BDV) | Magnetic Resonance Imaging sequence programming)

**[6] Medizintechnik (Master of Science)**

(Po-Vers. 2019w | TechFak | Medizintechnik (Master of Science) | Modulgruppen M1, M2, M3, M5, M7 nach Studienrichtungen | Studienrichtung Medizinelektronik | M5 Medizintechnische Vertiefungsmodule (MEL) | Magnetic Resonance Imaging sequence programming)

**[7] Medizintechnik (Master of Science)**

(Po-Vers. 2019w | TechFak | Medizintechnik (Master of Science) | Modulgruppen M1, M2, M3, M5, M7 nach Studienrichtungen | Study Field Health and Medical Data Analytics | M5 Medical Engineering specialisation modules (HMDA) | Magnetic Resonance Imaging sequence programming)

---

**Studien-/Prüfungsleistungen:**

Magnetic Resonance Imaging sequence programming (Prüfungsnummer: 76631)

Prüfungsleistung, Seminarleistung

Anteil an der Berechnung der Modulnote: 100%

weitere Erläuterungen:

Presentation and paper.

Erstablingung: SS 2021, 1. Wdh.: WS 2021/2022

1. Prüfer: Andreas Maier

---