# http://www.ric.edu/webcommunications/images/SealWithText_Small_Black.pngUNDERGRADUATE CURRICULUM COMMITTEE (UCC)PROPOSAL FORM

## Cover page scroll over blue text to see further important [instructions](#instructions): [if not working select “COMMents on rollover” in your Word preferences under view] please read these.

**N.B. DO NOT USE HIGHLIGHT, where choices are given within categories, please DELETE those THAT DO NOT APPLY TO YOUR PROPOSAL. Do not delete numbered categories.**

**ALL numbers in section (A) to be completed, including the impact ones (#5-7), put “none” if that is the case.**

|  |  |  |
| --- | --- | --- |
| A.1. [Course or program](#Proposal) | **MRI 431 Physical principles II** |  |
| [Replacing](#Ifapplicable)  |  |
| A.2. [Proposal type](#type) | **Course: creation** |
| A.3. [Originator](#Originator) | **Eric Hall** | [Home department](#home_dept) | **Biology/Health Sciences** |
| A.4. [Context and Rationale](#Rationale)  | **In this reorganization of the medical imaging program, new courses are being developed to cover the depth and breadth of content needed for certification as an MRI technologist.** |
| A.5. [Student impact](#student_impact) | **Improved readiness for working in the hospital or clinical environment** |
| A.6. [Impact on other programs](#impact)  | **None** |
| A.7. [Resource impact](#Resource) | [*Faculty PT & FT*](#faculty):  | **This course will be taught by LSMI faculty.** |
| [*Library*:](#library) | **None** |
| [*Technology*](#technology) | **None** |
| [*Facilities*](#facilities): | **None** |
| A.8. [Semester effective](#Semester_effective) | **Fall 2020** | A.9. [Rationale if sooner than next Fall](#Semester_effective) |  |
| A.10. INSTRUCTIONS FOR CATALOG COPY: This single file copy must include ALL relevant pages from the college catalog, and show how the catalog will be revised. (1) Go to the “Forms and Information” page on the UCC website. Scroll down until you see the Word files for the current catalog. (2) Download ALL catalog sections relevant for this proposal, including course descriptions and/or other affected programs. (3) Place ALL relevant catalog copy into a single file. Put page breaks between sections and **delete any catalog pages not relevant for this proposal**. (4) Using the track changes function, revise the catalog pages to demonstrate what the information should look like in next year’s catalog. (5) Check the revised catalog pages against the proposal form, especially making sure that program totals are correct if adding/deleting course credits. If new copy, indicate where it should go in the catalog. If making related proposals a single catalog copy that includes all is acceptable. Send as a separate single file along with this form. |

B. [NEW OR REVISED COURSES](#delete_if)  **DO NOT use highlight. Do not delete numbered categories, just leave blank if they do not apply. Delete this whole page if the proposal does not include a new or revised course. Always fill in b. 1 and B. 3 for context.**

|  | Old ([for revisions only](#Revisions))ONLY include information that is being revised, otherwise leave blank.  | NewExamples are provided within some of the boxes for guidance, delete just the examples that do not apply. |
| --- | --- | --- |
| B.1. [Course prefix and number](#cours_title)  |  | **MRI 431** |
| B.2. Cross listing number if any |  |  |
| B.3. [Course title](#title)  |  | **Physical Principles II** |
| B.4. [Course description](#description)  |  | Students learn about encoding, data collection, image formation, K-space, acquisitions, advanced pulse sequences, flow phenomenon, MRA, cardiac MRI, and quality assurance. |
| B.5. [Prerequisite(s)](#prereqs) |  | **MRI 304** |
| B.6. [Offered](#Offered) |  | **Fall** |
| B.7. [Contact hours](#contacthours)  |  | **4** |
| B.8. [Credit hours](#credits) |  | **4** |
| B.9. [Justify differences if any](#differences) |  |
| B.10. [Grading system](#grading)  |  | **Letter grade**  |
| B.11. [Instructional methods](#instr_methods) |  | **Lecture** |
| B.12.[Categories](#required) |  | **Required for major**  |
| B.13. Is this an Honors course? |  | **NO** |
| B.14. [General Education](#ge)N.B. Connections must include at least 50% Standard Classroom instruction. |  | **NO |****category:** |
| B.15. [How will student performance be evaluated?](#performance) |  | **Exams** **Assignments****Presentations** |
| B.16 [Recommended class-size](#class_size" \o "Check appendix XVIII in the UCC Manual for Best Practices) |  | **24** |
| B.17. [Redundancy statement](#competing) |  | **N/A** |
| B. 18. Other changes, if any |  |

| B.19**.** [**Course learning outcomes**](#outcomes)**: List each one in a separate row** | [**Professional Org.Standard(s)**](#standards)**, if relevant** | [**How will each outcome be measured**](#measured)**?** |
| --- | --- | --- |
| The student will:* Describe the three basic types of magnets and give the advantages and disadvantages of each.
* Discuss the differences in low-, mid-, high-, and ultra-high field systems.
* Explain the differences between the advanced pulse sequences.
* Apply the principle of pulse sequences and image formation to appropriate clinical applications.
* Understand flow phenomena as it applies to the mechanisms of flow, flow phenomena, TOF phenomenon, entry slice phenomenon, intra-voxel dephasing.
* Explain and understand flow phenomena compensation as it applies to even echo rephrasing, gradient moment rephrasing (nulling), and spatial pre-saturation.
* Understand vascular and cardiac imaging in MRI as it applies to conventional vascular imaging techniques, MRA- Magnetic Resonance Angiography, cardiac MRI, cardiac gating, peripheral gating, pseudo-gating, multiphase cardiac imaging, cine, and SPAMM.
* Apply the principle of vascular imaging in MRI to appropriate clinical applications.
* Understand functional imaging techniques: DWI, perfusion, SWI, fMRI, interventional, spectroscopy, whole body imaging, and MRM.
* Understand quality assurance as it applies to electronic measurements, NMR measurement, archival QA, QA of display and multiformat cameras and record keeping.
 |  | Examination, , presentations and quizzes |

| B.20. [**Topical outline**](#outline)**: DO NOT INSERT WHOLE SYLLABUS, JUST A TWO-TIER TOPIC OUTLINE. Proposals that ignore this request will be returned for revision.** |
| --- |
| 1. Instrumentation
	1. Magnetism
	2. Permanent magnets
	3. Electromagnets
	4. Superconducting magnets
	5. Fringe fields
	6. Shim coils
	7. Gradient coils
	8. Radiofrequency
	9. MR computer system and interface
2. Flow Phenomena
	1. Mechanisms of flow
	2. TOF
	3. Entry slice phenomena
	4. Intra voxel dephasing
	5. Flow compensation
	6. Even echo rephasing
	7. Gradient moment nulling
	8. Spatial pre-saturation
3. Artifacts
	1. Phase mismapping
	2. Aliasing
	3. Chemical shift
	4. Out of phase
	5. Truncation/Gibbs
	6. Susceptibility
	7. Cross excitation
	8. Zipper
	9. Shading
	10. Moiré
	11. Magic angle
	12. Eddy Currents
	13. Dielectric effect
4. MRI Safety
	1. Spatial gradients
	2. SAR
	3. Thermal injuries
	4. TVMF
	5. Peripheral nerve stimulation
	6. Magneto-phosphenes
	7. Acoustic noise
	8. Biological effects
5. MRI QA/QC
	1. Phantoms
	2. ACR requirements
	3. Center frequency
	4. Geometric accuracy
	5. SNR
	6. Contrast
6. Vascular and Cardiac Imaging
	1. MRA/MRV
	2. Black blood
	3. Bright blood
	4. 2D vs. 3D TOF
	5. Phase contrast
	6. VENC
	7. contrast enhanced
	8. ECg
	9. Peripheral gating
	10. Pseudo-gating
	11. Multiphase
	12. Cine
	13. SPAMM
7. Contrast Agents in MRI
	1. Mechanisms
	2. Molecular tumbling
	3. Dipole-dipole interactions
	4. Magnetic susceptibility
	5. Relaxivity
	6. Safety consideration of agents
	7. Other agents
	8. Applications
8. Functional Imaging Techniques
	1. DWI,
	2. Perfusion
	3. SWI
	4. fMRI
	5. Spectroscopy
	6. Interventional
	7. Wholebody
	8. MRM
 |

## D. Signatures

* Changes that affect General Education in any way MUST be approved by ALL Deans and COGE Chair.
* Changes that directly impact more than one department/program MUST have the signatures of all relevant department chairs, program directors, and their relevant dean (e.g. when creating/revising a program using courses from other departments/programs). Check UCC manual 4.2 for further guidelines on whether the signatures need to be approval or acknowledgement.
* Proposals that do not have appropriate approval signatures will not be considered.
* Type in name of person signing and their position/affiliation.
* Send electronic files of this proposal and accompanying catalog copy to curriculum@ric.edu and a printed signature copy of this whole form to the current Chair of UCC. Check UCC website for due dates.

##### D.1. Approvals: required from programs/departments/deans who originate the proposal. may include multiple departments, e.g., for joint/interdisciplinary proposals.

| Name | Position/affiliation | [Signature](#_Signature" \o "Insert electronic signature, if available, in this column) | Date |
| --- | --- | --- | --- |
| Eric Hall | Program Director of Medical Imaging | e-mail confirmation to curriculum@ric.edu | 4/1/2020 |
| Eric Roberts | Chair of Biology | e-mail confirmation to curriculum@ric.edu | 4/1/2020 |
| Earl Simson | Dean of FAS | e-mail confirmation to curriculum@ric.edu | 4/6/2020 |

##### D.2. [Acknowledgements](#acknowledge): REQUIRED from OTHER PROGRAMS/DEPARTMENTS (and their relevant deans if not already included above) that are IMPACTED BY THE PROPOSAL. SIGNATURE DOES NOT INDICATE APPROVAL, ONLY AWARENESS THAT THE PROPOSAL IS BEING SUBMITTED. CONCERNS SHOULD BE BROUGHT TO THE UCC COMMITTEE MEETING FOR DISCUSSION; all faculty are welcome to attend.

| Name | Position/affiliation | [Signature](#Signature_2) | Date |
| --- | --- | --- | --- |
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|  |  |  |  |
|  |  |  | Tab to add rows |