

ARISE MD

OVERVIEW

The **Advance Research training In SciEnce for MDs (ARISE-MD) PHD** at UAB is a physician scientist training pathway designed to prepare residents and fellows at UAB for the roles of researchers, scholars and leaders capable of making a substantive contribution to academic medicine. The ARISE-MD pathway is designed to build on previous training at the undergraduate medical education level obtained from a nationally accredited school of medicine. The multi-year program offers future clinician-scientists a pathway that combines clinical training with advanced research training in multiple arenas of basic science leading to a PhD degree from one of eight Graduate Biomedical Science (GBS) PhD themes. It is through immersion in a research project that ARISE-MD students gain the knowledge and skills required for the successful completion of a dissertation. Residents or fellows from any graduate medical education (GME) training program at UAB can apply to the ARISE-MD.

PROGRAM OUTCOMES

- Synthesize historical and philosophical knowledge as a foundation for the design and conduct of research that generates new knowledge
- Critically appraise and synthesize evolving knowledge as a foundation for a scientific program of research
- Generate knowledge that informs the design, implementation, and evaluation of interventions that contribute to the advancement of science and facilitate optimal patient, population, and health systems outcomes
- Conduct investigations based upon scientifically sound conceptual and methodological decisions about research designs, measures, and analytic methods
- Demonstrate scientific integrity in the design, conduct, and dissemination of research
- Participate in the mentoring of the next generation of physician scientists

ARISE-MD MINIMUM ADMISSION REQUIREMENTS

- A Doctor of Medicine (MD) from a nationally accredited institution, equivalent to that in the UAB School of Medicine
- Eligibility for licensure as a physician in Alabama
- Active resident or fellow matched at UAB through the UASOM Graduate Medical Education Office (**ERAS Application and Match Acceptance**)
- A personal statement that evidences prior research experiences, congruence between the applicant's research interests and chosen mentor's research, and future endeavors as a physician scientist in academic medicine
- A current CV or NIH Biosketch
- Two references from individuals with expertise to comment on the applicant's capability for research and scholarship (e.g., research mentor and UAB Residency or Fellow Chair)
- A personal interview with an ARISE-MD advisory member or designee

Biochemistry & Structural Biology (BSB) Theme - MSTP/ARISE

Requirements	Hours
Module Courses ¹	8
Theme Required Course	6
GBSC 742 GBS Student Theme Meeting Course ²	
GBS Required Courses	23
GRD 717 Principles of Scientific Integrity	
Grant-Writing/Scientific Communication ³	
Biostatistics ⁴	
Journal Clubs ⁵	
Three Advanced Courses ⁶	
MSTP/ARISE Required Courses	39
MSTP 794 Translational Research Seminar ⁷	
MSTP 795 Continuing Clinical Education ⁸	
Research ⁹	
Total Hours	76

- Four modular courses selected from the following: GBS 710, GBS 712, GBS 714, GBS 720, GBS 724, GBS 740A, GBS 740B, GBS 741, GBS 744, GBS 750, GBS 751, GBS 752, GBS 753, GBS 760, GBS 762, GBS 763, GBS 764, GBS 769, GBS 770, GBS 774, GBS 781, GBS 782, GBS 784, GBSC 718, GBSC 727, GBSC 729, GBSC 744, GBSC 747
- Required each fall and spring semester
- Course selected from the following: PSDO 700, GBS 716, GBS 725, GBSC 726, GRD 709, or other approved course
- Course selected from the following: GRD 770, BST 611, BST 612, BY 755, PY 716, or other approved course
- Required each fall and spring semester. Courses selected from the following: GBS 736, GBS 746J, GBS 756, GBS 776, GBS 786J, GBS 793, GBSC 700, GBSC 713, GBSC 720, INFO 673, INFO 793
- Three advanced courses selected from the following: GBS 700, GBS 702, GBS 715, GBS 718, GBS 726, GBS 727, GBS 729, GBS 739, GBS 742, GBS 749, GBS 754, GBS 757, GBS 758, GBS 765, GBS 775, GBS 778, GBS 779, GBS 783, GBSC 705, GBSC 706, GBSC 707, GBSC 709, GBSC 710, GBSC 712, GBSC 714, GBSC 715, GBSC 717, GBSC 721, GBSC 724, GBSC 725, GBSC 728, GBSC 730, GBSC 732, GBSC 734, GBSC 735, GBSC 736, GBSC 740, GBSC 741, GBSC 743, GBSC 745, GBSC 746, GBSC 748, INFO 701, INFO 702, INFO 703, INFO 704, INFO 751, INFO 762, INFO 796, INFO 797, BME 723, BME 770, BME 772, BME 780, or other approved course.
- Required every semester
- Required each fall and spring semester
- Student must complete 24 hours total of dissertation research, MSTP 799 or PSDO 799.

Cancer Biology (CANB) Theme - MSTP/ARISE

Requirements	Hours
Module Courses	8
GBS 710 Cell Signaling	
GBS 769 Carcinogenesis	
GBS 770 Pathobiology of Cancer	
GBS 774 Cancer Immunology	
Theme Required Courses	6

GBS 777	Cancer Biology Seminar ¹	
GBS Required Courses		23
GRD 717	Principles of Scientific Integrity	
Grant-Writing/Scientific Communication ²		
Biostatistics ³		
Journal Clubs ⁴		
Three Advanced Courses ⁵		
MSTP/ARISE Required Courses		39
MSTP 794	Translational Research Seminar ⁶	
MSTP 795	Continuing Clinical Education ⁷	
Research ⁸		
Total Hours		76

- ¹ Required each fall and spring semester.
- ² Course selected from the following: PSDO 700, GBS 716, GBS 725, GBSC 726, GRD 709, or other approved course.
- ³ Course selected from GRD 770, BST 611, BST 612, BY 755, PY 716, or other approved course.
- ⁴ Required each fall and spring semester. Courses selected from the following: GBS 736, GBS 746J, GBS 756, GBS 776, GBS 786J, GBS 793, GBSC 700, GBSC 713, GBSC 720, INFO 673, INFO 793
- ⁵ Three advanced courses selected from the following: GBS 700, GBS 702, GBS 715, GBS 718, GBS 726 GBS 727, GBS 729, GBS 739, GBS 742, GBS 749, GBS 754, GBS 757, GBS 758, GBS 765, GBS 775, GBS 778, GBS 779, GBS 783, GBSC 705, GBSC 706, GBSC 707, GBSC 709, GBSC 710, GBSC 712, GBSC 714, GBSC 715, GBSC 717, GBSC 721, GBSC 724, GBSC 725, GBSC 728, GBSC 730, GBSC 732, GBSC 734, GBSC 735, GBSC 736, GBSC 740, GBSC 741, GBSC 743, GBSC 745, GBSC 746, GBSC 748, INFO 701, INFO 702, INFO 703, INFO 704, INFO 751, INFO 762, INFO 796, INFO 797, BME 723, BME 770, BME 772, BME 780, or other approved course.
- ⁶ Required every semester.
- ⁷ Required each fall and spring semester.
- ⁸ Student must complete 24 hours total of dissertation research, MSTP 799 or PSDO 799.

Cell, Molecular & Developmental Biology (CMDB) Theme - MSTP/ARISE

Requirements	Hours
Module Courses ¹	8
Theme Required Courses	7
GBS 717	Methods and Scientific Logic
GBS 792	CMDB Seminar ²
GBS Required Courses	23
GRD 717	Principles of Scientific Integrity
Grant-Writing/Scientific Communication ³	
Biostatistics ⁴	
Journal Clubs ⁵	
Three Advanced Courses ⁶	
MSTP/ARISE Required Courses	39
MSTP 794	Translational Research Seminar ⁷
MSTP 795	Continuing Clinical Education ⁸
Research ⁹	
Total Hours	
77	

- ¹ Four modular courses selected from the following: GBS 710, GBS 712, GBS 714, GBS 720, GBS 724, GBS 740A, GBS 740B, GBS 741, GBS 744, GBS 750, GBS 751, GBS 752, GBS 753, GBS 760, GBS 762, GBS 763, GBS 764, GBS 769, GBS 770, GBS 774, GBS 781, GBS 782, GBS 784, GBSC 718, GBSC 727, GBSC 729, GBSC 744, GBSC 747
- ² Required each fall and spring semester.
- ³ Course selected from the following: PSDO 700, GBS 716, GBS 725, GBSC 726, GRD 709, or other approved course
- ⁴ Course selected from the following: GRD 770, BST 611, BST 612, BY 755, PY 716, or other approved course.
- ⁵ Required each fall and spring semester. Courses selected from the following: GBS 736, GBS 746J, GBS 756, GBS 776, GBS 786J, GBS 793, GBSC 700, GBSC 713, GBSC 720, INFO 673, INFO 793
- ⁶ Three advanced courses selected from the following: GBS 700, GBS 702, GBS 715, GBS 718, GBS 726, GBS 727, GBS 729, GBS 739, GBS 742, GBS 749, GBS 754, GBS 757, GBS 758, GBS 765, GBS 775, GBS 778, GBS 779, GBS 783, GBSC 705, GBSC 706, GBSC 707, GBSC 709, GBSC 710, GBSC 712, GBSC 714, GBSC 715, GBSC 717, GBSC 721, GBSC 724, GBSC 725, GBSC 728, GBSC 730, GBSC 732, GBSC 734, GBSC 735, GBSC 736, GBSC 740, GBSC 741, GBSC 743, GBSC 745, GBSC 746, GBSC 748, INFO 701, INFO 702, INFO 703, INFO 704, INFO 751, INFO 762, INFO 796, INFO 797, BME 723, BME 770, BME 772, BME 780, or other approved course.
- ⁷ Required each semester
- ⁸ Required each fall and spring semester
- ⁹ Student must complete 24 hours total of dissertation research, MSTP 799 or PSDO 799.

Genetics, Genomics and Bioinformatics (GGB) Theme - MSTP/ARISE

Requirements	Hours
Module Courses ¹	8
Theme Required Courses	7
GBS 717	Methods and Scientific Logic
GBSC 742	GBS Student Theme Meeting Course ²
GBS Required Courses	23
GRD 717	Principles of Scientific Integrity
Grant-Writing/Scientific Communication ³	
Biostatistics ⁴	
Journal Clubs ⁵	
Three Advanced Courses ⁶	
MSTP/ARISE Required Courses	39
MSTP 794	Translational Research Seminar ⁷
MSTP 795	Continuing Clinical Education ⁸
Research ⁹	
Total Hours	
77	

- ¹ Four modular courses selected from the following: GBS 710, GBS 712, GBS 714, GBS 720, GBS 724, GBS 740A, GBS 740B, GBS 741, GBS 744, GBS 750, GBS 751, GBS 752, GBS 753, GBS 760, GBS 762, GBS 763, GBS 764, GBS 769, GBS 770, GBS 774, GBS 781, GBS 782, GBS 784, GBSC 718, GBSC 727, GBSC 729, GBSC 744, GBSC 747
- ² Required each fall and spring semester

³ Course selected from the following: PSDO 700, GBS 716, GBS 725, GBSC 726, GRD 709, or other approved course

⁴ Course selected from the following: GRD 770, BST 611, BST 612, BY 755, PY 716, or other approved course.

⁵ Required each fall and spring semester. Courses selected from the following: GBS 736, GBS 746J, GBS 756, GBS 776, GBS 786J, GBS 793, GBSC 700, GBSC 713, GBSC 720, INFO 673, INFO 793

⁶ Three advanced courses selected from the following:
GBS 700, GBS 702, GBS 715, GBS 718, GBS 726, GBS 727, GBS 729, GBS 739, GBS 742, GBS 749, GBS 754, GBS 757, GBS 758, GBS 765, GBS 775, GBS 778, GBS 779, GBS 783, GBSC 705, GBSC 706, GBSC 707, GBSC 709, GBSC 710, GBSC 712, GBSC 714, GBSC 715, GBSC 717, GBSC 721, GBSC 724, GBSC 725, GBSC 728, GBSC 730, GBSC 732, GBSC 734, GBSC 735, GBSC 736, GBSC 740, GBSC 741, GBSC 743, GBSC 745, GBSC 746, GBSC 748, INFO 701, INFO 702, INFO 703, INFO 704, INFO 751, INFO 762, INFO 796, INFO 797, BME 723, BME 770, BME 772, BME 780, or other approved course.

⁷ Required each semester

⁸ Required each fall and spring semester

⁹ Student must complete 24 hours total of dissertation research, MSTP 799 or PSDO 799.

Immunology (IMM) Theme - MSTP/ARISE

Requirements	Hours
Module Courses	8
GBS 740A Introduction to Immunology Part 1	
GBS 740B Introduction to Immunology Part 2	
GBS 744 Mucosal Immunology	
GBS 741 Lymphocyte Biology	
Theme Required Courses	6
GBSC 742 GBS Student Theme Meeting Course ¹	
GBS Required Courses	23
GRD 717 Principles of Scientific Integrity	
Grant-Writing/Scientific Communication ²	
Biostatistics ³	
Journal Clubs ⁴	
Three Advanced Courses ⁵	
MSTP/ARISE Required Courses	39
MSTP 794 Translational Research Seminar ⁶	
MSTP 795 Continuing Clinical Education ⁷	
Research ⁸	
Total Hours	76

¹ Required each fall and spring semester

² Course selected from the following: PSDO 700, GBS 716, GBS 725, GBSC 726, GRD 709, or other approved course

³ Course selected from the following: GRD 770, BST 611, BST 612, BY 755, PY 716, or other approved course

⁴ Required each fall and spring semester. Courses selected from the following: GBS 736, GBS 746J, GBS 756, GBS 776, GBS 786J, GBS 793, GBSC 700, GBSC 713, GBSC 720, INFO 673, INFO 793

⁵ Three advanced courses selected from the following:
GBS 700, GBS 702, GBS 715, GBS 718, GBS 726, GBS 727, GBS 729, GBS 739, GBS 742, GBS 749, GBS 754, GBS 757, GBS 758, GBS 765, GBS 775, GBS 778, GBS 779, GBS 783, GBSC 705, GBSC 706, GBSC 707, GBSC 709, GBSC 710, GBSC 712, GBSC 714, GBSC 715, GBSC 717, GBSC 721, GBSC 724, GBSC 725, GBSC 728, GBSC 730, GBSC 732, GBSC 734, GBSC 735, GBSC 736, GBSC 740, GBSC 741, GBSC 743, GBSC 745, GBSC 746, GBSC 748, INFO 701, INFO 702, INFO 703, INFO 704, INFO 751, INFO 762, INFO 796, INFO 797, BME 723, BME 770, BME 772, BME 780, or other approved course.

⁶ Required every semester

⁷ Required each fall and spring semester

⁸ Student must complete 24 hours total of dissertation research, MSTP 799 or PSDO 799.

Microbiology (MIC) Theme - MSTP/ARISE

Requirements	Hours
Module Courses	8
GBS 760 Bacterial Genetics and Physiology	
GBS 762 Virology	
GBS 764 Introduction to Structural Biology Methods	
GBS 763 Microbial Pathogenesis	
Theme Required Courses	8
GBS 768 Communicating Science: Reading, Writing and Presentation	
GBSC 742 GBS Student Theme Meeting Course ¹	
GBS Required Courses	23
GRD 717 Principles of Scientific Integrity	
Grant-Writing/Scientific Communication ²	
Biostatistics ³	
Journal Clubs ⁴	
Advanced Courses ⁵	
MSTP/ARISE Required Courses	39
MSTP 794 Translational Research Seminar ⁶	
MSTP 795 Continuing Clinical Education ⁷	
Research ⁸	
Total Hours	78

¹ Required each fall and spring semester

² Course selected from the following: PSDO 700, GBS 716, GBS 725, GBS 768, GBSC 726, GRD 709, or other approved course

³ Course selected from the following: GRD 770, BST 611, BST 612, BY 755, PY 716, or other approved course

⁴ Required each fall and spring semester. Courses selected from the following: GBS 736, GBS 746J, GBS 756, GBS 776, GBS 786J, GBS 793, GBSC 700, GBSC 713, GBSC 720, INFO 673, INFO 793

- ⁵ Three advanced courses selected from the following:
 GBS 700, GBS 702, GBS 715, GBS 718, GBS 726, GBS 727,
 GBS 729, GBS 739, GBS 742, GBS 749, GBS 754, GBS 757,
 GBS 758, GBS 765, GBS 775, GBS 778, GBS 779, GBS 783,
 GBSC 705, GBSC 706, GBSC 707, GBSC 709, GBSC 710,
 GBSC 712, GBSC 714, GBSC 715, GBSC 717, GBSC 721,
 GBSC 724, GBSC 725, GBSC 728, GBSC 730, GBSC 732,
 GBSC 734, GBSC 735, GBSC 736, GBSC 740, GBSC 741,
 GBSC 743, GBSC 745, GBSC 746, GBSC 748, INFO 701,
 INFO 702, INFO 703, INFO 704, INFO 751, INFO 762, INFO 796,
 INFO 797, BME 723, BME 770, BME 772, BME 780, or other
 approved course
- ⁶ Required every semester
- ⁷ Required each fall and spring semester
- ⁸ Student must complete 24 hours total of dissertation research,
 MSTP 799 or PSDO 799.

Neuroscience (NEURO) Theme - MSTP/ARISE

Requirements	Hours
Module Courses	8
GBSC 744 Neuroanatomy	
GBSC 729 Cell Neurophysiology	
GBS 714 Developmental Neuroscience	
GBSC 727 Neuro Systems	
Theme Required Courses	9
GBS 737 Neuro Student Summer Seminar Series ¹	
NBL 703 Nuerobiology Seminar Series ²	
GBS Required Course	23
GRD 717 Principles of Scientific Integrity	
Grant-Writing/Scientific Communication ³	
Biostatistics ⁴	
Journal Clubs ⁵	
Three Advanced Courses ⁶	
MSTP/ARISE Required Course	39
MSTP 794 Translational Research Seminar ⁷	
MSTP 795 Continuing Clinical Education ⁸	
Research Hours ⁹	
Total Hours	79

- ¹ Required each summer semester
- ² Required each fall and spring semester
- ³ Course selected from the following: PSDO 700, GBS 716, GBS 725,
 GBSC 726, GRD 709, or other approved course
- ⁴ Course selected from the following: GRD 770, BST 611, BST 612,
 BY 755, PY 716, or other approved course
- ⁵ Required each fall and spring semester. Courses selected from the
 following: GBS 736, GBS 746J, GBS 756, GBS 776, GBS 786J,
 GBS 793, GBSC 700, GBSC 713, GBSC 720, INFO 673, INFO 793

- ⁶ Three advanced courses selected from the following:
 GBS 700, GBS 702, GBS 715, GBS 718, GBS 726, GBS 727,
 GBS 729, GBS 739, GBS 742, GBS 749, GBS 754, GBS 757,
 GBS 758, GBS 765, GBS 775, GBS 778, GBS 779, GBS 783,
 GBSC 705, GBSC 706, GBSC 707, GBSC 709, GBSC 710,
 GBSC 712, GBSC 714, GBSC 715, GBSC 717, GBSC 721,
 GBSC 724, GBSC 725, GBSC 728, GBSC 730, GBSC 732,
 GBSC 734, GBSC 735, GBSC 736, GBSC 740, GBSC 741,
 GBSC 743, GBSC 745, GBSC 746, GBSC 748, INFO 701,
 INFO 702, INFO 703, INFO 704, INFO 751, INFO 762, INFO 796,
 INFO 797, BME 723, BME 770, BME 772, BME 780, or other
 approved course
- ⁷ Required every semester
- ⁸ Required each fall and spring semester
- ⁹ Student must complete 24 hours total of dissertation research,
 MSTP 799 or PSDO 799.

Pathobiology, Pharmacology, & Physiology (P³) Theme - MSTP/ARISE

Requirements	Hours
Module Courses	8
GBS 750 Intro to Physiology	
GBS 751 Intro to Physiology II	
GBS 752 Intro to Pathobiology	
GBS 753 Intro to Pharmacology & Toxicology	
Theme Required Courses	6
GBSC 742 GBS Student Theme Meeting Course ¹	
GBS Required Courses	23
GRD 717 Principles of Scientific Integrity	
Grant Writing/Scientific Writing ²	
Biostatistics ³	
Journal Clubs ⁴	
Advanced Courses ⁵	
MSTP/Arise Required Courses	39
MSTP 794 Translational Research Seminar ⁶	
MSTP 795 Continuing Clinical Education ⁷	
Research ⁸	
Total Hours	76

- ¹ Required each fall and spring semester
- ² Course selected from the following: PSDO 700, GBS 716, GBS 725,
 GBSC 726, GRD 709, or other approved course
- ³ Course selected from the following: GRD 770, BST 611, BST 612,
 BY 755, PY 716, or other approved course
- ⁴ Required each fall and spring semester. Courses selected from the
 following: GBS 736, GBS 746J, GBS 756, GBS 776, GBS 786J,
 GBS 793, GBSC 700, GBSC 713, GBSC 720, INFO 673, INFO 793

- ⁵ Three advanced courses selected from the following:
 GBS 700, GBS 702, GBS 715, GBS 718, GBS 726, GBS 727,
 GBS 729, GBS 739, GBS 742, GBS 749, GBS 754, GBS 757,
 GBS 758, GBS 765, GBS 775, GBS 778, GBS 779, GBS 783,
 GBSC 705, GBSC 706, GBSC 707, GBSC 709, GBSC 710,
 GBSC 712, GBSC 714, GBSC 715, GBSC 717, GBSC 721,
 GBSC 724, GBSC 725, GBSC 728, GBSC 730, GBSC 732,
 GBSC 734, GBSC 735, GBSC 736, GBSC 740, GBSC 741,
 GBSC 743, GBSC 745, GBSC 746, GBSC 748, INFO 701,
 INFO 702, INFO 703, INFO 704, INFO 751, INFO 762, INFO 796,
 INFO 797, BME 723, BME 770, BME 772, BME 780, or other
 approved course
- ⁶ Required every semester
- ⁷ Required each fall and spring semester
- ⁸ Student must complete 24 hours total of dissertation research,
 MSTP 799 or PSDO 799.

PSDO 799. PSDO Dissertation Research. 1-8 Hour.
 Dissertation research. Only open to ARISE-MD students.
Prerequisites: GAC Z

Courses

PSDO 698. Master's Level Non-Thesis Research. 1-8 Hour.

Students may perform independent study in a research laboratory setting. This work may contribute toward the concentration credits subject to program director approval.

PSDO 699. Master's Level Thesis Research. 1-8 Hour.

Students perform independent study in a research laboratory setting. This work contributes directly to the completion of the degree and meets the degree requirements for graduation.

PSDO 700. Pathway to Grant Submission. 1 Hour.

This course is designed to give students a basic background in topics necessary to succeed as a physician scientist in today's academic medical environment. Topics to be covered include the NIH funding system, how to write a fellowship, record keeping, authorship and publication, conflict of interest, animal and human subjects, and finding a mentor (Open to MD-PhD, ARISE-MD, and DMD-PhD students).

PSDO 701. Career Development Grant Writing Workshop. 1 Hour.

This course is designed to assist postdocs, residents, fellows, and rising junior faculty with the creation and submission of a K award or equivalent grant application. Topics to be covered include the NIH funding system, how to write a fellowship, how to submit animal protocols, and how to submit IRB forms. Individuals will be given a variety of reading assignments from which they will be expected to participate in group discussions and/or presentations. They will also be expected to prepare a fellowship application that will be submitted to an NIH Funding agency.

PSDO 720. Critical Approaches & Clinical Evaluation of Kidney Disease. 1 Hour.

Enhance knowledge of kidney disease physiology to include expansion of the themes from the Mount Desert Island Biologic Laboratory (MDIBL) course on the "Origins of Renal Physiology" Promote structured critical thinking skills focused on kidney disease. Enhance experimental design skills for the development and testing of new hypotheses. Enhance constructive reviewing skills. Engage in the culture and language of medicine through exposure to a range of clinical experiences. Provide opportunities for PROMoTE scholars and clinical faculty to discuss areas where basic science and clinical medicine intersect and where new information could be beneficial. Expose PROMoTE scholars to clinical problems and a variety of team-based investigation.

PSDO 798. PSDO Non-Dissertation Research. 1-8 Hour.

Non-Dissertation research. Only open to ARISE-MD students.