

# ACVR Diagnostic Imaging Residency Training Program Application

This application is required for institutions desiring ACVR accreditation of a new residency training program and for institutions requesting re-accreditation of an existing program.

Before beginning the application process, all applicants should review the most recent version of the [ACVR Residency Program Essential Training Standards and Requirements](#) (RPE) document (accessed from the Essentials Homepage) in detail. Use the RPE as a reference when completing the application form, as the contents you provide herein will be evaluated by the Residency Standards and Evaluation Committee (RSEC) against the published RPE standards. This application form follows the headings of the RPE. All terms used in this application have same definitions as those in the RPE, and no information provided in the application form itself will supersede that published in the RPE.

During the application review process, the Chair or Assistant Chair of the RSEC may contact the applicant for additional information or clarification.

*\*Note: If you wish to save your submission and complete it later, click the save button located at the bottom of the pages. You will be emailed a link to complete your form at a later date.*

## ACVR Residency Training Program Application

### Program Summary

The Residency Director of the program is expected to be the primary applicant and contact person for this application. The Residency Director must be located at the primary training institution.

<b>Institution Name</b>	North Carolina State University
<b>Residency Program Director Name</b>	Nathan Nelson
<b>Residency Program Director Email</b>	ncnelso2@ncsu.edu

### Program Type

**What type of residency program is being requested?**

Traditional Residency Program

**If approved, what is the proposed start date of this residency program?**

Wednesday, January 1, 2025

### Objectives

**Succinctly state the objectives of the training program.**

To provide training in large and small animal radiology, ultrasound, nuclear medicine, computed tomography and magnetic resonance imaging to fulfill the requirements of the American College of Veterinary Radiology (ACVR) and be able to perform successfully in academic or specialty practice.

### Training Period

**What is the total length of the training program?** 36

**What is the anticipated length of supervised clinical training a resident will experience during this program?** 30

**Will the resident(s) in this program be eligible to take the ACVR Preliminary Exam in September of their third year?** Yes

**What are the responsibilities of the resident(s) during non-clinical portions of the program?**

The 6 months off-clinics is spent preparing for the ACVR board examinations, completing a research project, vacation (12 days per year), and on externships (optional).

## ACVR Residency Training Program Application

### Direction and Supervision

When calculating time commitment in this section, you may consider a 100% (full time) duty schedule to consist of 48 weeks per year with 8 hours per day or 40 hours per week.

### Residency Director

Please review the Residency Director requirements and responsibilities in the [ACVR Residency Program Essential Training Standards and Requirements](#) (RPE) document. Note that the Residency Director will be required to provide at least 24 weeks of clinical duty per year in primary support of residents in this program and to meet all other qualifications of a Supervising Diplomate.

**Is the applicant Residency Director for this program prepared to meet these requirements?** Yes

**What percentage of the Residency Director's time is committed to clinical service at the primary training institution?** 60

**How many weeks per year will the Residency Director be on clinical service and teaching residents at the primary training institution?** 31

## ACVR Residency Training Program Application

### Additional Training Diplomates

Please review the definitions and responsibilities of [Supervising Diplomate and Supporting Diplomate](#) in the RPE document. Note that Supervising Diplomates will be required to provide at least 10 weeks of clinical duty in primary support of residents in this program, and are expected to participate in all facets of residency training. Supporting Diplomates aid in residency training, but provide support that is limited, as by modality (e.g. only works in ultrasound), time commitment (e.g. clinical duty < 10 weeks per year), or other constraints that prevent them from qualifying as a Supervising Diplomate. Provide a copy of affiliation agreements with any diplomates that are located at an external institution (see Affiliation Agreement item at the end of this section).

**Excluding the Residency Director, please list all training diplomates who will act as Supervising Diplomates of this residency program. Indicate the approximate number of hours per year each supervisor will be scheduled on clinical duty with primary support of residents and, if applicable, any specific areas of instructional responsibility (e.g. trains mostly in small animal, trains mostly in MRI, etc). If a 'Supervising Diplomat' position will be comprised of multiple radiologists, please list the cohort as a single entity or institution for this question (e.g. "teleradiologists" or private institution name)**

Name: Erin Keenihan

Hours/Year: 940

Specific Areas and/or Limitations of Instructional Responsibility: No limitations

Institution: NC State University

Name: Nicholas Petrovitch

Hours/Year: 1870

Specific Areas and/or Limitations of Instructional Responsibility:

Institution: NC State University

Name: Gabi Seiler

Hours/Year: 1000

Specific Areas and/or Limitations of Instructional Responsibility:

Institution: NC State University

Name: Maria Evola

Hours/Year: 520

Specific Areas and/or Limitations of Instructional Responsibility:

Institution: NC State University

**Please list all training diplomates who will act as Supporting Diplomates of this residency program. Indicate how many hours per year each Supporting Diplomate will be scheduled on clinical duty with primary support of residents and any specific areas of instructional responsibility and/or limitations in the scope of this support (e.g. only trains residents in ultrasound, does not participate in large animal training, does not finalize imaging reports, etc).**

Name: Ally Hamlin

Hours/Year: 200

Specific Areas of Instructional Responsibility:  
Remote finalization of resident reports; provides feedback on reports to resident

Institution:

Name: Katie Lehman

Hours/Year: 200

Specific Areas of Instructional Responsibility:  
Remote finalization of resident reports; provides feedback on reports to resident

Institution:

In addition to ACVR/ECVDI Diplomates, the program must arrange for the resident(s) to have direct access to specialists in other areas. Please identify one member in each of the specialty colleges listed below that has agreed to support this program through clinical activity that allows regular interactions between the specialist and the diagnostic imaging residents (e.g. discussion of diagnostic work up, imaging findings, or patient outcomes, and/or participation in interdisciplinary rounds, etc). Indicate whether the specialist is located on-site at the primary institution at an external institution. Provide a copy of affiliation agreements with any non-ACVR/ECVDI diplomates that are located at an external institution (see Affiliation Agreement section at the end of this application).

Upon completion of this application, the below individuals will receive an email requesting acknowledgement of their support of your residency program.

<b>ACVIM Member Name</b>	Karyn Harrell
<b>ACVIM Member Institution</b>	NC State University
<b>ACVIM Member Email</b>	kaharrell@ncsu.edu
<b>ACVS Member Name</b>	Kyle Mathews
<b>ACVS Member Institution</b>	NC State University
<b>ACVS Member Email</b>	kmathews@ncsu.edu
<b>ACVP Member Name</b>	Keith Linder
<b>ACVP Member Institution</b>	NC State University
<b>ACVP Member Email</b>	kelinder@ncsu.edu

# ACVR Residency Training Program Application

## Resident:Supervising Diplomate Ratio

The number of residents in the program cannot exceed twice the number of Supervising Diplomates **on-site**. Remote Supervising Diplomates will not count when calculating the maximum residents allowed in a given program.

What is the maximum number of imaging interns you will have enrolled in this training program at any given time? 8

# ACVR Residency Training Program Application

## Facilities

Review the Facility Requirements listed in the RPE document. Note also that residents should have opportunities to be involved with image acquisition and protocol set-up.

Does this residency training program provide on-site access to modern equipment for the following modalities?

Digital or Computed Radiography	Yes
Fluoroscopy	Yes
Ultrasound with Doppler Capability	Yes
MRI	Yes
Fan-beam CT	Yes
Nuclear scintigraphy	Yes

**Briefly describe how this program meets the facility requirements, including the specific type of CT and MRI units available. Explain how your program will train residents in modalities for which equipment is not located on site, providing affiliation agreements if applicable. (see Affiliation Agreement item at the end of this section)**

### Small Animal Radiology

- Room 1: Siemens Multix Top, Ceiling mounted unit. 80KW generator with Canon CXDI 50G Flat panel digital system.
- Room 2: Siemens Digital Fluoroscopy. 80 KW generator and Canon CXDI 50G at panel digital system.
- Room 3: Siemens Multix Top Ceiling mounted unit. 80KW generator with Canon CXDI 50G Flat panel digital system.
- GE IGS 530 Fluoroscopy/Digital Angiography
- Genoray Oscar 15 C-arm

### Large Animal Radiology

- Ceiling mounted x-ray tube with mechanical and electric interlocking to an autotracking image plate holder and Canon CXDI 50G and 1417 CDXI -710C digital flat panel.

- Ceiling mounted x-ray tube with extension capabilities to floor level with Canon CXDI –810C digital flat panel.
- MinX-ray portable generator interfaced with either CXDI 50G, CDXI -710C or CXDI –810C digital flat panel.

#### Ultrasonographic equipment:

- Two Canon Aplio i700 Ultrasound Machines with two 11MC4 (microconvex), two i8C1 (convex), two i18L5X (linear matrix) and one 17LH7 (small linear “hockeystick”) probes.
- 1 Canon Aplio i500 Ultrasound Machine with the following probes: 10C3 (convex), 14L5 (linear), 6C1 (convex), 11MC4 (microconvex), and 18L7 (linear).
- Elastography, Fusion, Contrast Ultrasound and 3D imaging technology.
- 6 Sonoscape Ultrasound Machines for Teaching each with a linear and microconvex probe.

#### CT equipment:

- Siemens Perspective 64, Multislice helical scanner
- Samsung BodyTom mobile CT for large animal imaging

#### Nuclear medicine equipment:

- MiE Equine Scanner Gamma Camera

#### MRI equipment:

3.0T Siemens Skyra MRI suite. Unit configured for small animal and equine.

#### Radiology Information System and PACS

- Web based Fuji RIS fully integrated with IBM Merge PACS with IBM Merge V8.0 Halo Viewer and ClientOutlook eUnity html5 viewer.
- Multiple Merge eFilm V4.2 workstations
- Multiple 3 monitor workstations with dual NEC 3MP monochrome monitors or dual Dell 4K color monitors.

#### Miscellaneous

- Fuji CR System
- Multiple workstations with NEC 3MP monochrome monitors.

### **Please describe how residents will gain experience in image acquisition and protocol set-up for each of these modalities (excluding nuclear medicine).**

Resident spend two weeks at beginning of the residency learning large and small animal imaging set-up/positioning techniques and image acquisition. They spend their first CT and MRI rotations working with the technologists of those modalities learning the protocols and setup. On ultrasound, a radiologist is in the ultrasound suite; early in residency they receive extensive training from the radiologist on image acquisition in ultrasound. They run the CT and ultrasound units on an emergency basis throughout residency.

## **ACVR Residency Training Program Application**

### **Clinical Resources and Training Content**

Review the clinical resource and training content requirements listed in the RPE document

**What is the average annual caseload at the primary institution over the past 3 years? This number will include all patient visits whether or not they contribute to the annual imaging caseload.** 33231

**What is the average annual imaging caseload at the primary institution over the past 3 years? Each body region imaged for a given patient (e.g. thorax, abdomen, spine, etc) will count as a single study.**

18522

What is the average annual imaging caseload at the primary institution over the past 3 years in the following categories?

<b>Small animal radiology</b>	9700
<b>Large animal radiology</b>	1270
<b>Abdominal ultrasound</b>	4501
<b>Non-abdominal ultrasound</b>	800
<b>Computed tomography</b>	1225
<b>Magnetic Resonance Imaging</b>	695
<b>Nuclear scintigraphy</b>	331
<b>Other (Specify)</b>	Echocardiography - 2450

**Indicate the approximate species breakdown of the imaging caseload at the primary institution in the following categories:**

- Small animals (canine, feline): 80
- Large animals (equine, bovine, porcine, etc.): 15
- Avian, Exotic, and Wildlife animals: 5

Which of the following types of imaging cases will the resident(s) have direct, on-site exposure to at the primary institution during the residency program?

<b>Echocardiography</b>	Yes
<b>Large animal ultrasound</b>	Yes
<b>Nonabdominal small animal ultrasound (i.e. cervical, musculoskeletal)</b>	Yes
<b>Food/fiber animal imaging</b>	Yes
<b>Exotics imaging</b>	Yes
<b>Teleradiology/Referral imaging</b>	Yes

**Explain how the resident(s) in this program will gain experience in any of the above types of**

imaging cases that are NOT available at the primary institution. Provide affiliation agreements, if applicable. (see Affiliation Agreement item at the end of this section).

Residents have designated teleradiology weeks with Antech Imaging Services. As part of that teleradiology rotation, the residents review cases, generate reports, and receive feedback from AIS radiologists.

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What percentage of the total imaging caseload at the primary institution results in a written imaging report being generated by either the residents or the training radiologist diplomates in this program?

99

What percentage of the preliminary reports generated from the imaging caseload are initially produced by the resident(s) in this program?

99

Does this institution concurrently support the training of diagnostic imaging interns?

No

What percentage of resident-generated reports are reviewed by training diplomates prior to finalization of the report?

95

What is the average turnaround time for resident-generated preliminary reports to be finalized by training diplomates?

Generally within 48 hours, though with lower faculty numbers can extend to 3-7 days especially during conferences, vacations, etc. A plan is being implemented to mitigate this and reduce report turnaround time.

What percentage of all imaging reports (resident and diplomate generated) is finalized and available to requesting clinicians within 48 hours after the exam is submitted for radiologist consult?

50

If < 75%, please explain.

Up until recently, report turnaround for finalization was within 48 hours. Within the last 6 months, with lower faculty numbers that turnaround time has extended. We are putting into place mechanisms (such as Dr. Lehman and Dr. Hamlin review of reports) that should decrease that again to less than 48 hours.

Please describe how after-hours/weekend/holiday cases are handled at the primary institution. How does this affect resident-reported imaging caseload?

There is a resident on call who is responsible for writing cases from over the weekend. Preliminary reports are then reviewed by faculty the following Monday/next workday. Residents share on call weekend duty equally amongst themselves.

For each category below, calculate the approximate number of cases that a single resident will interpret at the primary institution with radiologist feedback during the course of the entire residency program. These

numbers should be calculated using the annual imaging caseload adjusted to include only those with written reports generated by the residents. In general, this number should then be divided by the total number of residents in a program during a given year.  
 If external rotations for the resident(s) are employed to increase the resident caseload in any given category, please be sure to upload affiliate agreements that include the expected number of reports that residents can expect to generate (with radiologist feedback) for cases in those categories.

<b>Small animal radiology</b>	4850
<b>Large animal radiology</b>	635
<b>Abdominal ultrasound</b>	2250
<b>Non-abdominal ultrasound</b>	400
<b>Computed tomography</b>	612
<b>Magnetic resonance Imaging</b>	347
<b>Nuclear scintigraphy</b>	165
<b>Other (specify)</b>	Echo - 30

**How many ultrasound exams will a single resident perform with radiologist supervision and feedback during the course of the entire program? Scans for which the resident writes a report but does not acquire images are excluded.**

3000

**Do residents in this program have ample hands-on training and practice opportunities to become proficient in the performance of ultrasound guided fine needle aspirates and biopsies?**

Yes

Please indicate whether this training program includes formal courses in any of the following topics:

<b>Physics of Diagnostic Imaging</b>	Yes
<b>Radiobiology</b>	Yes
<b>Nuclear Medicine</b>	Yes
<b>Ultrasonography</b>	Yes
<b>Computed Tomography</b>	Yes
<b>Magnetic Resonance Imaging</b>	Yes

Other

No

**Briefly describe the formal courses that are available for the resident(s) in this program by indicating the institution, course title, course number, and credit hours as well as any other relevant information. For any topics for which formal course work is not provided for the resident(s), please explain how educational objectives in these topics will be met.**

The above topics are covered in a formal 2 credit course the radiology residents audit: Radiology Resident Physics Course - offered at UNC- Chapel Hill School of Medicine. MRI is also taught in the form of weekly rounds. At this rounds

session, faculty radiologists discuss approximately 10-15 cases, and imaging protocols, as well as differential diagnoses and image interpretation. The Neurology service joins these rounds once a month to provide additional input.

All topics are discussed in weekly Board Objective Rounds over the course of a year. Residents attend courses such as Nuclear Medicine Short Course, MRI in practice, LA imaging course, as available and offered outside of NC State.

**Do residents have access to a majority of the written pathology reports that are generated from patients included in this imaging caseload?**

Yes

**Will the resident(s) in this program attain an advanced degree (MS, PhD) at the conclusion of the program?**

No

## ACVR Residency Training Program Application

### Research Environment

Review the Research Requirements listed in the RPE document.

**Over the last five years, what is the average number of peer reviewed publications on which the training diplomates (Supervising and Supporting diplomates) of this program are included as authors? (total number of publications in last 5 years among all training diplomates divided by the number of training diplomates)** 10

**How many peer-reviewed publications are expected of a resident completing the program?** 1

**If this is an established program, what percentage of residents have made formal research presentations at the annual ACVR or equivalent national meeting?** 75

**Briefly describe if/how residents are encouraged to engage in investigative work and what**

**mechanisms are in place for training diplomates to support this work.**

All residents are encouraged to identify an area of research interest or even a specific project at the beginning of their residency. Residents are then matched with one or two faculty members to design the research projects, collect and analyze data and publish a manuscript. Results of the research study are presented at the ACVR conference. The Molecular Biomedical Sciences Department provides basic funding for each resident projects, and depending on the project an ACVR resident research grant proposal is submitted. All training diplomates have oclinics time assigned to pursue scholarly activities which includes supervising resident research projects. The college of veterinary medicine employs a full time statistician to provide support.

## **Educational Environment**

Review the Educational Environment expectations listed in the RPE document.

**Please list and enumerate the formal presentations that are expected of each resident during the course of their training. In general, didactic lectures, departmental seminars, scientific presentations, Continuing Education presentations, and similar are considered "formal". Informal topic rounds, journal club, small group teaching (like student rounds), student labs, and similar events should not be included.**

There are two formal presentations expected of each resident. These are open to the College, and attended by house officers and faculty. These are either Continuing education focused or presenting their scientific research. If their research is complete, it is also expected to be presented at the ACVR conference. Residents also give two lectures on physics and digital imaging to veterinary students on clinical rotation. Residents interested in teaching can also volunteer to give lectures in thoracic/abdominal imaging to the incoming intern class.

**Briefly describe the type and extent of teaching opportunities that are provided to the resident throughout the training program.**

Residents provide two weekly teaching sessions with veterinary students (interactive, case based). Third year residents also lead case based discussion sessions with residents of other specialties (surgery, ECC).

**Briefly describe the nature and scope of the teaching file available to the resident(s) in this program and how it is maintained/updated.**

Clinical images from 2002 to present are in a digital format and available through the Radiology Information System (RIS). These cases are indexed by keywords that can be searched in the RIS. Searches in the RIS can be accessed using the report assessments, descriptions, patient signalment and exam type parameters. These cases are directly linked to the PACS system for web-based image retrieval.

**How many Known Case Conferences are conducted annually?** 49

**Describe the nature and frequency of resident rounds ("other educational events") planned for this program. You may upload an example schedule with the general program schedule that is requested at the end of this application.**

Monday 8-9am - Topic round (Equine, neurology/MRI, histopathology, resident topic presentations)  
Tuesday 8-9 am - Radiology journal club  
Thursday 8-9 am - College House officer seminar  
Monday to Thursday 9-10 am - Clinical rounds

**Describe how the resident(s) in this program will attain direct and consistent medical library access and/or how they will access research tools and medical literature including the suggested references listed in the ACVR Preliminary Examination study guide.**

The William Rand Kenan, Jr. Library of Veterinary Medicine is on-site. All relevant veterinary journals are available online or on-site through the University library. Most reference books are available in radiology, those who are not in the radiology library can be found in the library of the college of veterinary medicine.

# ACVR Residency Training Program Application

## Evaluation and Protection of Residents

**For existing programs, list the names, email contact information, and start/end dates of your current residents.**

Spencer Fennik 7/21 - 7/24 srfennik@ncsu.edu  
Tania Hunt 7/21 - 7/24 tdhunt4@ncsu.edu  
Raj Multani 7/21 - 7/24 rsmultan@ncsu.edu  
Alexa Frink 7/22 - 7/25 agfrink@ncsu.edu  
Brendan Crowley 7/22 - 7/25 bcrowle@ncsu.edu  
Roshanak Mokhtari 7/22 - 7/25 rmokhta2@ncsu.edu  
Erik Knipprath 7/23 - 7/26 eaknippr@ncsu.edu  
Hitomi Kurihara 1/24 - 1/27 hkuriha@ncsu.edu

**Did all of your current residents adequately complete the last 6 months of training?**

Yes

**List the current members of the resident review committee.**

All current radiology faculty. Each resident also has an outside mentor:

Spencer Fennik - Yu Ueda DACVECC  
Tania Hunt - Olivia Petritz DACZM  
Raj Multani - Daniel Duffey DACVS (SA)  
Alexa Frink - Lauren Schnabel DACVS (LA)  
Brendan Crowley - Karen Tefft DACVIM (SA)  
Roshanak Mokhtari - Kursten Pierce DACVIM(cardiology)  
Erik Knipprath - to be determined  
Hitomi Kurihara - to be determined

**Describe the internal mechanisms in place at your institution to protect the resident(s) if personal or organizational conflicts arise. Include the management hierarchy for residents and procedures by which residents would report workplace misconduct.**

Evaluations are performed twice a year in December and April and are submitted to the Student Services at North Carolina State University College of Veterinary Medicine. Any instance where a resident "does not meet standards" in any of the evaluation criteria the Faculty Committee of House Officer Programs and Resources (FCHOPR) is notified. Each resident is evaluated by the radiology faculty and has a faculty mentor outside the radiology group. This mentor, as well as the FCHOPR committee, are possible points of contact for the residents should conflicts arise.

# ACVR Residency Training Program Application

## Appendix

Please provide the following information regarding preliminary and certifying board exam pass rates for residents in your program over the past five years.

## Preliminary Board Exam Pass Rate

## 2020

Number Of Prelim Board Eligible Residents: 3

Number of Residents That Took Prelim Exam: 3

Number of Residents That Passed On 1st Attempt: 3

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 0

## 2019

Number Of Prelim Board Eligible Residents: 3

Number of Residents That Took Prelim Exam: 3

Number of Residents That Passed On 1st Attempt: 3

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 0

## 2018

Number Of Prelim Board Eligible Residents: 3

Number of Residents That Took Prelim Exam: 3

Number of Residents That Passed On 1st Attempt: 2

Number of Residents That Passed After Multiple Attempts: 1

Number of Residents That Have Not Passed: 0

**2017**

Number Of Prelim Board Eligible Residents: 3

Number of Residents That Took Prelim Exam: 3

Number of Residents That Passed On 1st Attempt: 3

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 0

**2016**

Number Of Prelim Board Eligible Residents: 2

Number of Residents That Took Prelim Exam: 2

Number of Residents That Passed On 1st Attempt: 2

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 0

## **Certifying Board Exam Pass Rate**

**2020**

Number of Certifying Board Eligible Residents: 3

Number of Residents That Took Certifying Exam: 3

Number of Residents That Passed On 1st Attempt: 3

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 0

## 2019

Number of Certifying Board Eligible Residents: 3

Number of Residents That Took Certifying Exam: 3

Number of Residents That Passed On 1st Attempt: 2

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 1

## 2018

Number of Certifying Board Eligible Residents: 3

Number of Residents That Took Certifying Exam: 3

Number of Residents That Passed On 1st Attempt: 2

Number of Residents That Passed After Multiple Attempts: 1

Number of Residents That Have Not Passed: 0

## 2017

Number of Certifying Board Eligible Residents: 2

Number of Residents That Took Certifying Exam: 2

Number of Residents That Passed On 1st Attempt: 1

Number of Residents That Passed After Multiple Attempts: 1

Number of Residents That Have Not Passed: 0

2016

Number of Certifying Board Eligible Residents: 3

Number of Residents That Took Certifying Exam: 3

Number of Residents That Passed On 1st Attempt: 3

Number of Residents That Passed After Multiple Attempts: 0

Number of Residents That Have Not Passed: 0

## Program Schedule

Upload a schedule for your residents that outlines their clinical and non-clinical work over the course of the residency program. This may be a master schedule or duty roster for your entire radiology section, if desired. If available, an example weekly or monthly rounds schedule can also be included.

### Program Schedule



1 CLINIC SCHEDULE TRUNC... .xlsx

## Affiliation Agreements

Upload digital copies of any affiliation agreements that have not been included elsewhere in this document. Refer to the RPE document for an explanation of what information should be included in such agreements.