Radiology of Indiana - MRI MSK

Protocol	FOV (CM)	Slice	Spacing
Shoulder			
(Optimal patient positioning is with external rotation of the humerus; patient permitting)			
AX T1	16	3	1
AX PD FS	16	3	1
COR PD	15	3	1
COR T2	15	3	1
COR STIR	15	3	1
SAG PD	15	3	1
SAG T2 FS	15	3	1
AX T1 FS (if contrast)	16	3	1
AX T1 FS +C	15	3	1
COR T1 FS +C	15	3	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Shoulder Arthrogram			
AX T1 FS	16	3	1
COR T1 FS	15	3	1
SAG T1 FS	15	3	1
AX T2 FS	16	3	1
COR T1	15	3	1
COR T2 FS	15	3	1
SAG PD	15	3	1
SAG T2 FS	15	3	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Axilla or Groin			
AX T1	20	3	1
AX STIR	20	3	1
COR T2	20	3	1
SAG T2	20	3	1
AX T1 FS	20	3	1
AX T1 FS +C	20	3	1
COR T1 FS +C	20	3	1
**** Place skin marker on area of interest ****			
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Scapula			
AX T1	20-25	4	0.5
AX STIR	20-25	4	0.5
AX GRE	20-25	4	0.5
COR T1	20-25	4	0.5
COR STIR	20-25	4	0.5
SAG T2	20-25	4	0.5
SAG STIR	20-25	4	0.5
AX T1 FS (if contrast)	20-25	4	0.5
AX T1 FS +C	20-25	4	0.5
COR T1 FS +C	20-25	4	0.5
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			

Elbow			
SAG T2 FS	16	3	1
SAG T1	16	3	1
AX T2 FS	16	3	1
AX T1	16	3	1
COR STIR	16	3	1
COR T2	16	3	1
COR GE	16	3	1
AX T1 FS (if contrast)	16	3	1
AX T1 FS +C	16	3	1
SAG T1 FS +C	16	3	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Elbow FEVER			
(Flexed Elbow Valgus External Rotation)			
See: https://www.ajronline.org/doi/full/10.2214/AJR.21.25608			
Complete Elbow protocol listed above and			
OBL COR PD FS	16	3	1
OBL COR T2	16	3	1
Elbow Arthrogram			
AX T1 FS	16	3	1
AX T2 FS	16	3	1
COR T1 FS	16	3	1
SAG T1 FS	16	3	1
COR T1	16	3	1
COR T2 FS	16	3	1
SAG T2 FS	16	3	1
SAG T2 FS	16	3	1
Wrist			
AX T1	10	2.5	0.5
AX T2 FS	10	2.5	0.5
COR STIR	10	2.5	0.3
COR T2	10	2.5	0.3
COR 3D GE	10	2.5	0.3
SAG T1	10	3	0.5
SAG T2 FS	10	3	0.5
AX T1 FS (if contrast)	10	2.5	0.5
AX T1 FS +C	10	2.5	0.5
COR T1 FS +C	10	2.5	0.3
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Wrist Arthrogram			
AX T1 FS	10	2.5	0.5
COR T1 FS	10	2.5	0.3
SAG T1 FS	10	3	0.5
AX T2 FS	10	2.5	0.5
COR T1	10	2.5	0.3
COR T2 FS	10	2.5	0.3
SAG STIR	10	3	0.5

Hand			
Coronal imaging should be parallel to the metacarpal bones and extend from the radiocarpal joint to the fingertips. Sagittal slices are best oriented with the long finger/third metacarpal. Axial images should be perpendicular to the metacarpal and phalangeal bones with the smallest FOV to include all of the hand structures			
AX T2 FS	12	3	0.5
AX T1	12	3	0.5
COR GE	15-19	3	0.5
COR T2 FS	15-19	3	0.5
COR T1	15-19	3	0.5
SAG T1	15-19	3	0.5
SAG STIR	15-19	3	0.5
AX T1 FS (if contrast)	12	3	0.5
AX T1 FS +C	12	3	0.5
COR T1 FS +C	15-19	3	0.5
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Finger			
If thumb is area of interest, orient all three plans to the first MCP joint: i.e. with both pollicis sesamoids visible on a single coronal image and the sagittal images perpendicular to the coronal images.			
SAG STIR	10-12	3	0.5
SAG T1	10-12	3	0.5
COR T2 FS	10-12	3	0.5
COR GE	10-12	3	0.5
COR T1	10-12	3	0.5
AX T2 FS	10-12	3	0.5
AX T1	10-12	3	0.5
AX T1 FS (if contrast)	10-12	3	0.5
AX T1 FS +C	10-12	3	0.5
COR T1 FS +C	10-12	3	0.5
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Upper Extremity Long Bone (Humerus, Forearm)			
SAG T2 FS	32-34	4	1
SAG T1	32-34	4	1
COR STIR	32-34	4	1
COR T1	32-34	4	1
AX STIR	18-20	5	2
AX T1	18-20	5	2
AX T1 FS (if contrast)	18-20	5	2
AX T1 FS +C	18-20	5	2
COR T1 FS +C	32-34	4	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Hip(s) Without contrast			
AX STIR Pelvis	36	5	1
AX T1 Pelvis	36	5	1
COR STIR Pelvis	36	5	1
COR T1 Pelvis	36	5	1
OBL AX PD FS (both sides if bilateral)	20	3	1
COR PD FS (both sides if bilateral)	20	3	1
SAG T2 FS (both sides if bilateral)	20	3	1

Hip(s) With Contrast			
AX STIR Pelvis	36	5	1
AX T1 FS Pelvis	36	5	1
COR STIR Pelvis	36	5	1
COR T1 Pelvis	36	5	1
OBL AX PD FS (both sides if bilateral)	20	3	1
COR PD FS (both sides if bilateral)	20	3	1
SAG T2 FS (both sides if bilateral)	20	3	1
AX T1 FS Pelvis	36	3	1
AX T1 FS Pelvis + C	36	3	1
COR T1 FS + C (both sides if bilateral)	20	3	1
SAG T1 FS + C (both sides if bilateral)	20	3	1
Hip Arthrogram			
COR T1 FS	20	3	1
SAG T1 FS	20	3	1
OBL AX PD FS	20	3	1
SAG T2 FS	20	3	1
COR T2 FS	20	3	1
AX T2 FS (Pelvis)	36	5	1
COR T1 (Pelvis)	36	5	1
COR STIR (Pelvis)	36	5	1
HIP - Metal Artifact Reduction Sequence (MARS)			
All sequence are with proprietary metal artifact reduction:			
WARP - Siemens			
MAVRIC - GE			
O-MAR - Philips			
AX T1 Pelvis	40	5	1
Ax STIR Pelvis	40	5	1
COR T1 Pelvis	40	5	1
COR STIR Pelvis	40	5	1
OBL AX PD (Hip)	20	3	1
SAG T2 (Hip)	20	3	1
COR PD (Hip)	20	3	1
SAG STIR (Hip)	20	3	1
Sports Hernia, Athletic Pubalgia, Adductor Tear/Strain			
COR T1	36	4	1
COR STIR	36	4	1
AX T2 F/S	36	5	1
AX Oblique PD	20	4	0.5
AX Oblique T2 F/S	20	4	0.5
SAG T2 F/S	22	4	0.5
Hamstring Tear			
Axial PD/T2 Fat Sat (Bilat Hip Joints thru 1/2 -2/3 Femora)	37	7	2
COR T1 (Bilat Hip Joints thru 1/2 -2/3 Femora)	37	5	1
COR STIR (Bilat Hip Joints thru 1/2 -2/3 Femora)	37	5	1
Reposition Patient			
AX T1 (Affected side in iso-center)	27	5	1
AX T2 Fat Sat (Affected side in iso-center)	27	5	1
SAG T2 Fat Sat (Affected side in iso-center)	37	5	1

Knee			
AX T1	15	3	1
AX T2 FS	15	3	1
COR PD	15	3	1
COR PD FS	15	3	1
SAG PD	15	3	1
SAG T2	15	3	1
SAG PD FS (STRAIGHT)	15	3	1
OBLIQUE COR T2	15	2	0.5
AX T1 FS (if contrast)	15	3	1
AX T1 FS +C	15	3	1
COR T1 FS +C	15	3	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Knee Arthrogram			
AX T1 FAT SAT	15	3	1
AX T2 FAT SAT	15	3	1
COR T1	15	3	1
COR T1 FAT SAT	15	3	1
COR PD FAT SAT	15	3	1
SAG T1 FAT SAT (Meniscal Orientation)	15	3	1
SAG PD (Meniscal Orientation)	15	3	1
SAG T2 FAT SAT (STRAIGHT)	15	3	1
No ACL sequence needed			
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Knee - Metal Artifact Reduction Sequence (MARS)			
All sequence are with proprietary metal artifact reduction:			
WARP - Siemens			
MAVRIC - GE			
O-MAR - Philips			
AX T1	15	3	1
AX STIR	15	3	1
COR T2	15	3	1
COR T1	15	3	1
COR STIR	15	3	1
SAG T2	15	3	1
SAG STIR	15	3	1
Ankle/Hindfoot			
SAG STIR	17	3	1
SAG T1	17	3	1
AX T2 FS	15	3	1
AX PD	15	3	1
COR T2	17	3	1
COR STIR	17	3	1
OBL AX PD FS (best prone to eliminate magic angle)	15	3	1
OBL AX T2 (best prone to eliminate magic angle)	15	3	1
AX T1 FS (if contrast)	15	3	1
AX T1 FS +C	15	3	1
SAG T1 FS +C	17	3	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			

Ankle (Achilles)			
SAG STIR	22	3	1
SAG T2	22	3	1
SAG T1	22	3	1
AX T2 FS	15	3	1
AX PD	15	3	1
COR T2	17	3	1
COR STIR	17	3	1
Foot/Forefoot			
SAG STIR	16	3	1
SAG T1	16	3	1
COR STIR	16	3	1
COR T1	16	3	1
AX T2 FS	14	3	1
AX T1	14	3	1
AX T1 FS (if contrast)	14	3	1
AX T1 FS +C	14	3	1
SAG T1 FS +C	16	3	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Midfoot			
(Dedicated Lisfranc ligament and/or midfoot Chopart/Charcot assessment)			
Center over the Midfoot (TMT joints)			
AX T1	14	3	1
AX T2 FS	14	3	1
COR T1	16	3	1
COR T2	16	2.5	1
COR STIR	16	3	1
SAG T1	16	3	1
COR STIR	16	3	1
SAG T1	16	3	1
SAG STIR	16	3	1
Osteomyelitis			
SAG T1	13	3	0.5
SAG STIR	13	3	0.5
COR T1	13	3	0.5
COR STIR	13	3	0.5
AX T1	13	2.5	0.5
AX STIR	13	2.5	0.5
AX T1 FS PRE	13	2.5	0.5
AX T1 FS +C	13	2.5	0.5
SAG T1 FS +C	13	3	0.5
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Toe Routine			
SAG STIR	13	3	0.5
SAG T1	13	3	0.5
COR STIR	13	3	0.5
COR T1	13	3	0.5
AX T2 FS	13	2.5	0.5
AX T1	13	2.5	0.5

Lower Extremity Long Bone (Femur, Tib/Fib)			
SAG T1	42-45	5	1
SAG T2 FS	42-45	5	1
COR T1	42-45	5	1
COR STIR	42-45	5	1
AX T1	22	6	2
AX STIR	22	6	2
AX T1 FS PRE	22	6	2
AX T1 FS +C	22	6	2
COR T1 FS +C	42-45	5	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Bony Pelvis			
COR T1	36	5	1
COR STIR	36	5	1
AX T1	36	5	1
AX STIR	36	5	1
SAG T2 FS	36	5	1
AX T1 FS PRE	36	5	1
AX T1 FS +C	36	5	1
COR T1 FS +C	36	5	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Sacrum/SI Joints			
(Assessment of bone/joint pathology, otherwise see MRI Neuro for Lumbosacral spine and/or sacral plexus concerns)			
AX T1 GLOBAL	40	5	1
AX STIR GLOBAL	40	5	1
SAG T2 FS	19	4	1
SAG T1	19	4	1
COR STIR	24	3	1
COR T1	24	3	1
AX T2 FS	20	4	1
AX T1 FS PRE	20	4	1
AX T1 FS +C	20	4	1
SAG T1 FS +C	19	4	1
*If there is metal artifact that degrades image quality, substitute all T1 Fat sat sequences with T1 non fat sat or consult with Radiologist			
Myositis (Lower Extremity)			
AX T1	40 x 50	8	1
AX T2 Fat Sat	40 x 50	8	1
COR T1	50	5	1
COR STIR	50	5	1
SAG STIR	40 x 50	5	1
* Scan both thighs at same time from top of hips to tibial plateau.			
* If ordering provider requests pelvis for gluteal muscle groups a separate pelvis MRI should be ordered.			

Myositis (Upper Extremity)			
AX T1	20 x 20	6	1
AX T2 Fat Sat	20 x 20	6	1
COR T1	20 x 40	4	1
COR STIR	20 x 40	4	1
SAG STIR	20 x 40	4	1
* Scan above shoulder through elbow			
* Scan each humerus separate (Right and Left) and orientate to humerus			
Sternum			
AX T1	20-25	4	0.5
AX STIR	20-25	4	0.5
AX GRE	20-25	4	0.5
COR T1	20-25	3	0.5
COR STIR	20-25	3	0.5
SAG T2	20-25	3	0.5
SAG T1	20-25	3	0.5
SAG STIR	20-25	3	0.5
AX T1 FS (if contrast)	20-25	4	0.5
AX T1 FS +C	20-25	4	0.5
COR T1 FS +C	20-25	3	0.5
Bone Lesion/Tumor			
(Use protocol for nearest body part and then add these 2 sequences)			
AX In/Out Phase	*	3	1
COR In/Out Phase	*	3	1
Soft Tissue "Tumor"			
* FOV and Spacing subject to area of concern. Use same FOV and Spacing as the closest joint or body part.			
Axial T1	*	*	*
Axial PD Fat Sat	*	*	*
Axial GRE	*	*	*
Ax T1 Fat Sat	*	*	*
Cor T2	*	*	*
Cor STIR	*	*	*
Sag T2 Fat Sat	*	*	*
Cor In/Out Phase	*	*	*
If contrast ordered:			
Triplane T1 Fat Sat Post	*	*	*