# FA05 –Functional Anatomy

## **Assessment**: Assignment

|  |  |
| --- | --- |
| **Name** |  |
| **Email address** |  |

### Student Instructions

Assignments may include a variety of questions, this can include short or longer answer questions. These questions are designed to test how you apply your knowledge into a real-world situation. All assignments are completed as a Microsoft Word document and must be submitted through My eCampus for grading. Your assessor is looking for how you apply your knowledge and how you think critically about the topic area.

1. It is important to have a sound knowledge of posture and the involvement of musculoskeletal anatomy and appropriate corrective actions. In the following table, you will need to identify the postural abnormality, identify the tight and weak muscles, and provide suggestive corrective actions. (limit 50-100words per postural abnormality)

|  |  |  |
| --- | --- | --- |
|  | Postural abnormality |  |
| Tight muscles |  |
| Weak muscles |  |
| Suggested corrective exercises (Strengthening and Stretching) |  |

|  |  |  |
| --- | --- | --- |
|  | Postural abnormality |  |
| Tight muscles |  |
| Weak muscles |  |
| Suggested corrective exercises (Strengthening and Stretching) |  |

|  |  |  |
| --- | --- | --- |
|  | Postural abnormality |  |
| Tight muscles |  |
| Weak muscles |  |
| Suggested corrective exercises (Strengthening and Stretching) |  |

2. There are five common injuries that occur as a result of poor posture. In the following table, provide a description of each of these five conditions, outlining the impact that they have on posture as well as the muscles involved and how they are affected. (range 50-100 words per condition)

| Injury | Condition | Posture and muscles involved |
| --- | --- | --- |
| **Sciatica** |  |  |
| **Neck pain** |  |  |
| **Patellofemoral knee pain** |  |  |
| **Lower back pain** |  |  |
| **Shoulder impingement** |  |  |

3. There is a definitive relationship between poor posture, increased risk of injury, and muscular deficit. Please describe how poor posture exacerbates each of the following.

|  |  |
| --- | --- |
| 1. Diminished muscle strength and endurance |  |
| 2. Limited flexibility |  |
| 3. Increased muscle tension and tone |  |
| 4. Limited function |  |

4. In the following table, several joint complexes are listed. You will need to record the main planes of movement that the joint can work within, the movement types and the range of motion for each movement type.

|  |  |
| --- | --- |
| **Sagittal Plane** | |
| Description |  |
| Movements that take place in this plane |  |
| Example of an exercise in this plane |  |
| **Frontal Plane** | |
| Description |  |
| Movements that take place in this plane |  |
| Example of an exercise in this plane |  |
| **Transverse Plane** | |
| Description |  |
| Movements that take place in this plane |  |
| Example of an exercise in this plane |  |

5. Skeletal muscles are arranged throughout the body in opposing pairs. During movement, each muscle within the pair opposes the other, which allows movement to occur. In the following table, use the same exercise and provide an example of each muscle and describe a movement associated with it?

|  |  |  |
| --- | --- | --- |
| Muscles | Movement description | Muscle involved |
| Agonist |  |  |
| Antagonist |  |  |
| Synergist |  |  |
| Fixator |  |  |

6. What is Wolff’s law? How is it linked to bone modelling and remodelling? (limit 100 words per factor)

|  |
| --- |
|  |

7. There is a range of different conditions and lifestyles that can change the centre of gravity and affect posture. Please complete the following table and describe how these factors result in a change in gravity and thus affect posture. (limit 50 words per factor)

|  |  |
| --- | --- |
| Factor that affects the centre of gravity | Description of how posture is affected |
| **Pregnancy** |  |
| **Overweight** |  |
| **Inappropriate footwear** |  |
| **Poor work practices  (office worker)** |  |

8. Agility is the ability to control changes in direction and body position quickly and effectively. There are several factors that affect coordination and agility. Complete the following table, explaining how each factor impacts coordination and agility.

|  |  |
| --- | --- |
| Factor that affects agility | Description of how it impacts agility |
| **Fine motor skills** |  |
| **Gross motor skills** |  |
| **Hand eye skills** |  |

9. Ideal postural alignment is important for maintaining optimum health and wellbeing. Explain what the postural deviations are in the the three spinal postures below.

|  |  |
| --- | --- |
| **Spinal posture** | **Description** |
| Scoliosis |  |
| Kyphosis |  |
| Lordosis |  |

10. In order to prevent injury, it is important to have an understanding of how the body may respond to exercise if there is an injury. Complete the following table by providing an explanation for each of the situations given.

| Anatomical situation | Description |
| --- | --- |
| Increase pronation of foot and ankle complex |  |
| Increase supination of foot and ankle |  |
| Hyperextension of knees |  |
| Lateral tilt of pelvis |  |
| Forward head posture |  |
| Rotated patella |  |

11. Describe the difference between the three (3) different class levers?

|  |  |
| --- | --- |
| Class of lever | Definition |
| First class levers |  |
| Second class levers |  |
| Third class levers |  |

12. Record two types of exercise that are beneficial in improving the skills outlined in the table below.

|  |  |
| --- | --- |
| Skills | Two types of exercise |
| Balance |  |
| Agility |  |
| Power |  |
| Speed |  |
| Reaction time |  |
| Co-ordination |  |
| Proprioception |  |

13. Changes in musculoskeletal anatomy and physiology are fundamental to fitness improvements. In the following table, record the changes in each anatomical and physiological structure of the musculoskeletal system.

|  |  |
| --- | --- |
| Musculoskeletal anatomy and physiology | Changes and improvements in response to fitness |
| Skeleton |  |
| Joints |  |
| Cellular structure of muscle fibre |  |
| Sliding filaments  (actin and myosin) |  |

14. It is important to have sound knowledge of anatomical terminology, not least because you will continue to apply it in the other fitness units in this program. Describe each of the following anatomical terminologies. (limit 20-50 words per anatomical terminology)

| Terminology | Description |
| --- | --- |
| **Anatomical position** |  |
| **Superior** |  |
| **Inferior** |  |
| **Proximal** |  |
| **Distal** |  |
| **Lateral** |  |
| **Medial** |  |
| **Superficial** |  |
| **Deep** |  |
| **Sagittal** |  |
| **Frontal** |  |
| **Horizontal** |  |

15. Complete the table below by inputting the range of motion of each joint movement. The first one has been completed for you as an example.

| Joint | Movement | Range of motion (degrees) |
| --- | --- | --- |
| **Elbow** | Flexion | *0 – 145* |
| Extension | *0* |
| **Knee** | Flexion |  |
| Extension |  |
| **Shoulder** | Flexion |  |
| Extension |  |
| Abduction |  |
| Adduction |  |
| **Hip** | Flexion |  |
| Extension |  |
| Abduction |  |
| Adduction |  |
| **Wrist** | Flexion |  |
| Extension |  |
| Abduction |  |
| Adduction |  |
| **Ankle** | Plantar Flexion |  |
| Dorsiflexion |  |

16. Complete the table below by describing the function and location of each mucle

| Muscle | Function of muscle | Location of the muscle  Use directional terminology such as distal, proximal, anterior and posterior |
| --- | --- | --- |
| **Biceps** |  |  |
| **Tibialis anterior** |  |  |
| **Anterior deltoid** |  |  |
| **Latissimus dorsi** |  |  |
| **Hamstring** |  |  |
| **Triceps** |  |  |

17. Answer the following questions regarding fast and slow twitch muscle fibres.

|  |  |
| --- | --- |
| **Slow twitch fibres** | What is the firing rate of slow twitch fibres? |
|  |
| What types of exercise or activities are slow twitch fibres most suited for? |
|  |
| Are slow twitch fibres predominately recruited for aerobic or anaerobic exercise? |
|  |
| Can muscle fibre types change in response to targeted exercise? |
|  |
| **Fast twitch fibres** | What is the firing rate of fast twitch fibres? |
|  |
| What types of exercise or activities are fast twitch fibres most suited for? |
|  |
| Can muscle fibre types change in response to targeted exercise? |
|  |

18. As a personal trainer, it is important that you understand anatomical planes, joints and muscles involved in functional anatomy. Fill in the table provided.

| Anatomical region | Directional movement | Anatomical plane (sagittal, frontal, transverse) | List some of the muscles involved in the |
| --- | --- | --- | --- |
| **Shoulder** | Shoulder flexion |  |  |
| Shoulder extension |  |  |
| Shoulder adduction |  |  |
| Shoulder abduction |  |  |
| **Hip** | Hip flexion |  |  |
| Hip extension |  |  |
| Hip adduction |  |  |
| Hip abduction |  |  |

19. Describe the role of the central and peripheral nervous systems, including somatic and autonomic nervous systems, in the control of skeletal muscle. In your response, you will need to highlight the following:

a) Nervous control and nerve impulse

b) Structure and function of a neuron

c) Role of a motor neuron

d) Role of the muscle proprioceptors and the stretch reflex

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20. Define reciprocal inhibition and its relevance to exercise. (limit 50 words)

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21. Describe the neuromuscular adaptations to training that occur and how this effects performance.

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22. In the following table, describe what the lever system is in relation to joints, which you will do in the Movement column, and provide one example of where it is found in the human body.

|  |  |  |
| --- | --- | --- |
| Joint | Movement | Example |
| **Gliding** |  |  |
| **Hinge** |  |  |
| **Pivot** |  |  |
| **Saddle** |  |  |
| **Condyloid** |  |  |
| **Ball and socket** |  |  |

23. Describe the benefits, risks, and application of static (passive and active) and dynamic stretching. (limit 100 words)

|  |  |  |
| --- | --- | --- |
| Stretching | Benefits | Risks |
| **Dynamic** |  |  |
| **Static (active and passive)** |  |  |

24. Describe proprioceptive neuromuscular facilitation (PNF) and how it assists active and passive range of motion as well as its use in rehabilitation? (limit 100 words)

|  |
| --- |
|  |

25. The cardiovascular system is essential in aerobic and anaerobic styles of exercise. Describe the following structures of the heart.

|  |  |
| --- | --- |
| The function of heart valves | 1. Tricuspid valve |
|  |
| 2. Pulmonary valve |
|  |
| 3. Aortic valve |
|  |
| Coronary circulation |  |

26. Describe the short-term and long-term effects of exercise on blood pressure . (limit 80-100 words)

|  |
| --- |
|  |

27. Exercise effects a range of different aspects of the musculoskeletal system. Exercise can affect the bones, ligaments and muscles. Please complete the table below (limit 80-100 words).

|  |  |
| --- | --- |
| Changes in musculoskeletal system | Description |
| **Increase in synovial fluid production** |  |
| **Increase joint range of motion** |  |
| **Increase bone density** |  |
| **Stronger ligament** |  |

28. Define delayed onset muscle soreness (DOMS). What causes it and how do we prevent it? (limit 50-80 words)

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| --- |
|  |

29. Describe three (3) short-term and three (3) long-term effects of exercise on the musculoskeletal system. In your answer for short term effects you will need to include blood flow, muscle fatigue and exhaustion. In the long term effects you will need to include muscle size, muscle co-ordination and blood supply. (limit 50 words)

|  |
| --- |
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30. There is a number of benefits and limitations when monitoring exercise intensity. In your response, address the following topics: (limit 50-100 words)

|  |  |
| --- | --- |
| Monitoring exercise intensity | Description |
| **Talk test** |  |
| **Rate of perceived exertion** |  |
| **Heart rate monitoring** |  |

31. Describe the expected physiological responses to the following situations and settings. (limit 50-100 words)

|  |  |
| --- | --- |
| Situations and settings | Physiological Responses |
| **A single bout of exercise** |  |
| **Physical activity in various environmental conditions (heat, cold, and high altitude)** |  |
| **Long-term exercise programs** |  |

32. Describe the industry-endorsed risk stratification procedures and how clients are classified as low, moderate or high risk.

|  |  |
| --- | --- |
| Low risk clients |  |
| Moderate risk clients |  |
| High risk clients |  |

33. Referrals from medical or allied health professionals can be required at times for clients who are at risk of exercise-induced issues. In the following table, define each Allied Health Professional role and the types of referral they may receive.

| Medical and allied health professional | Types of referral for each professional |
| --- | --- |
| **Sports physician** |  |
| **General practitioner** |  |
| **Physiotherapist** |  |
| **Exercise physiologist** |  |
| **Remedial massage therapist** |  |
| **Chiropractor** |  |
| **Osteopath** |  |
| **Accredited practising Dietician** |  |
| **Registered Psychologist** |  |
| **Occupational Therapist** |  |
| **Podiatrist** |  |
| **Continence nurse advisor** |  |

34. In the following table, describe the range of functional movement measuring tools to support dynamic posture analysis. (limit 30-50 words per term).

|  |  |
| --- | --- |
| Functional measure | Description |
| **Goniometer** |  |
| **Plumb line** |  |
| **Grid** |  |
| **Plurimeter** |  |
| **Pressure biofeedback unit** |  |
| **Photographic technology** |  |
| **Video analysis** |  |
| **Tape measure** |  |
| **Flexometer** |  |

35. There are several legislative and regulatory requirements that a personal trainer needs to be aware of. Describe each of the following terms and how they relate to the fitness industry.

(limit 30-50 words per term)

|  |  |
| --- | --- |
| Legislative and regulatory requirement | Description |
| **Privacy** |  |
| **Anti-discrimination** |  |
| **Work health and safety** |  |
| **Duty of care** |  |
| **Business licenses** |  |
| **Consumer protection** |  |

36. There is a range of organisational policies and procedures relevant to the fitness industry. Describe each of the following terms and how they relate to the fitness industry.

| Legislative and regulatory requirement | Description |
| --- | --- |
| **Confidentiality** |  |
| **Hygiene** |  |
| **Emergency** |  |
| **Standards of personal presentation** |  |
| **Participants clothing and footwear** |  |
| **Use, care, and maintenance of equipment** |  |

37. Please describe the benefits of a properly functioning balance system? Explain the complex processes around sensimotor control in achieveing balance. In your answer, please address the following:

* Sensory input
* Propriception
* Vestibular system
* Integration of sensory input and motor output. (word rangd 150-200)

|  |
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|  |

38. For each of the following identify if a referral to a medical or allied health professional is necessary, and to who you could refer the client?

| **Condition/symptom** | **Is a referral needed?** | **Whom would you refer the client to (if applicable)** |
| --- | --- | --- |
| Chest pain at rest or during activity |  |  |
| Severe breathlessness/feeling faint/dizziness/loss of balance |  |  |
| Unusual fatigue or shortness of breath |  |  |
| Asthma aggravation/attack |  |  |
| Limited flexibility |  |  |
| Significant muscle, bone or joint pain (beyond what is normally expected during exercise) |  |  |
| Recent rapid weight change |  |  |
| Frequent or persistent headaches |  |  |
| Above average BMI |  |  |
| Visual problems such as diploplia or visual aura |  |  |
| Balance or coordination deficit |  |  |
| Above average waist to hip ratio |  |  |
| Unexplained exercise intolerance |  |  |

39. Below is your organisations’ template for completing a referral request. There are 4 editable fields on this letter for you to complete for each client.

#### Referral Template

|  |
| --- |
| *Mark Stevens*  1. MEDICAL/ALLIED HEALTH PROFESSIONAL *1/01/20XX*  *Total Health*  *321 Healthy St, Orange NSW 2121*  Dear Mark,  Referral for: 2. CLIENT NAME  I would like your guidance for the above mentioned client. The client who has expressed interest in undertaking Personal Training sessions with the goals of 3. CLIENT GOAL.  I have attached a copy of the client’s pre-exercise screening.  During the pre-screening process I have identified the following:  4.REASON FOR REFERRAL  I am requesting your guidance to assist this client to exercise safely and effectively in regards to the above mentioned. Please provide further guidance in regards to appropriate exercises and intensities as well as any contraindications.  Regards,  A Personal Trainer  Total Fitness |

#### Task

For each of the below clients complete the table with the relevant information that you need to input into their referral letter.

1. Chris Litt is a 52 year old male who has diabetes and hypertension and he is wanting to participate in cardiovascular exercise with the long term goal of losing 20kg.

|  |  |
| --- | --- |
| 1. Medical/allied health professional |  |
| 1. Client name |  |
| 1. Client goal |  |
| 1. Reason for referral |  |

1. Darcy Jones is a 24 year old male who has epilepsy. His goal is to improve his cardiovascular fitness and his muscular strength in a safe environment.

|  |  |
| --- | --- |
| 1. Medical/allied health professional |  |
| 1. Client name |  |
| 1. Client goal |  |
| 1. Reason for referral |  |

1. Martin Timms is a 55 year old male who has a congenital heart murmur. He would like to improve his general fitness and flexibility to aid him in daily living activities.

|  |  |
| --- | --- |
| 1. Medical/allied health professional |  |
| 1. Client name |  |
| 1. Client goal |  |
| 1. Reason for referral |  |

1. Aria Mena has a prolapsed bladder which occurred 10 years ago during childbirth. She has only been moderately active since then and would now like to focus more on her health and fitness. She would like to improve her cardiovascular and muscular endurance to play with her children.

|  |  |
| --- | --- |
| 1. Medical/allied health professional |  |
| 1. Client name |  |
| 1. Client goal |  |
| 1. Reason for referral |  |

1. Timothy Lundt has persistent lower back pain that can sometimes be so painful that he cannot get out of bed. He works in an office and sits all day long which makes his back pain worse. He has not sought medical advice. He is hoping that by improving his strength and losing weight that he might improve his back pain as well as his overall fitness.

|  |  |
| --- | --- |
| 1. Medical/allied health professional |  |
| 1. Client name |  |
| 1. Client goal |  |
| 1. Reason for referral |  |

40. Case Study – Tom Jones

Tom Jones is a new client of yours who would like to book weekly Personal Training sessions. He has completed a pre-exercise screening tool and has identified that he has high blood pressure. There are no other risk factors present. You have also completed a postural analysis with Tom and he appears to have kyphosis.

He has recently started attending the gym 3 times a week to do his own workouts and he is quite happy with his current routine. He is however finding that he has a very tight neck and shoulders and that this is causing him discomfort both at the gym and in daily life. Initially he would like his program with you to focus on improving his posture.

Before you commence training with Tom you have sent a referral request to his General Practitioner.

*Thankyou for referring Tom. Today during his visit his blood pressure was 142/90. I will continue to monitor this with Tom. Participation in a graded exercise program will be beneficial for Tom. There are no contraindications for his participation however I recommend starting with a low to moderate intensity program.*

#### Task

Write a 30 minute personal training program for Tom that focuses on improving his posture and stretching any tight muscles. He would also like you to include some upper body strengthening exercises to try to correct his posture.

In your program you must include:

• A warm up that specifies the activity duration and intensity

• A conditioning phase that contains:

o At least 3 strengthening exercises to aid in improving his posture

o At least 3 stretches (to be performed in-between exercises) to aid in releasing tight muscles

• A cool down that contains full body stretches

### Complete the flexibility program template.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Client name:** | | **Tom Jones** | | |  | | **Client age:** | | | **44** | | | **Goal:** | | | **Flexibility to promote ideal posture** | | |
|  | |  | |  | | |  | | |  | | |  | | |  |  |
| **Warm up** | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| **Conditioning phase** | | | | | | | | | | | | | | | | | |
| **Exercise** | | | **Intensity** | | **Sets** | | | **Reps** | | | **Rest period** | | | **Temp** | | **Notes** | |
|  | | |  | |  | | |  | | |  | | |  | |  | |
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| **Cool down** | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| **Notes for next session** | | | | | | | | | | | | | | | | | |
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