THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 2: Studies in Foundation Courses

Final Report (2015-16)

Report due 31 December 2016
Please return by email to The Ad hoc Committee on Planning of eLearning Infrastructure mmcd@cuhk.edu.hk

PART I

Project title: "Skill-related Stretching for Required and Elective Physical Education Courses"
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Co-supervisor(s): Mr. Yuen Pak-yan, Dr. Ng Siu-kuen, Mr. Tang Tsz-ming, Ms. Chan Sau Wa
Department / Unit: Physical Education Unit
Project duration: From January 2016 to December 2016
Date report submitted: 30 December 2016

1. Project objectives

The project is on track to meet its objectives and the objectives have not been changed.

Stretching is a vital component of physical education since it helps enhance the sports performance and reduce the risk of injury.

In order to enhance the teaching and learning performance of the required and elective Physical Education (PE) courses, stretching exercise (general stretching and skill-related stretching) would be introduced to all undergraduate students of required and elective PE courses through an online teaching video and an e-booklet. General stretching exercises fit all PE courses and are mainly for injury prevention, the skill-related stretching exercises are sports specific which fit into individual PE course and are mainly for performance enhancement.

Through watching the video or reading the e-booklet before and after the lessons, the blending learning strategy of flipped classroom could be applied. Students can perform self-learning (e.g. pre-study and revision) by making good use of the online video and e-booklet. Thus, it is hoped to increase students' learning motivation, reduce their risk of injury and improve their performance on different sports.

2. Process, outcomes or deliverables

One micro-module was produced. An online teaching video of stretching of approximately 40 minutes has been produced. For easy reference, the video was further divided into a number of sessions of general stretching by different body parts. The summary of the teaching video was compiled into an e-booklet (for staff and students).

Originally, the video was planned to be divided into two major parts (General stretching and Skill-related stretching). After thoughtful consideration, an introduction video was added so as to supplement information like types of stretching, advantages of stretching as well as guidelines and rules of stretching. Skill-related stretching is not separated as an individual part in the video as planned. Instead, the video is divided into a number of sessions of general stretching by different body parts. An index of skill-related stretching for different sports events has been provided in the e-booklet for users to set their own combination.

The micro-module developed has been used for both required and elective PE courses of different sports events. From January to August of 2016 was a development phase for the micro module, and the 1st Term of 2016-2017 was a period of application and evaluation.
As a trial, 19 classes out of 164 classes (which have covered all of the 18 subjects of required and elective PE courses provided in 1st Term of 2016-2017) were selected to conduct flipped classroom activities with the micro-module produced. It is expected that students can perform self-learning by making good use of the online video and e-booklet before and after class. Thus, it is hoped to increase students' learning motivation, reduce their risk of injury and improve their performance on different sports.

Overall, the project was completed satisfactorily with very positive feedback received from both teachers and students.

Two major deliverables of the project:

i) An online teaching video of stretching
ii) An e-booklet

3. Evaluation Plan

Both student surveys and focus-group interview were conducted to assess the effectiveness of the micro-module in facilitating teaching and learning.

The evaluation plan has been slightly changed. Since video production, feedback collection and video editing took time, the pre-test and post-test surveys had been changed into an effectiveness assessment survey due to the time limit. The number of focus group also decreased.

Findings

Survey

Nineteen out of 164 classes in semester 1 (2016-2017) were randomly selected to evaluate the effectiveness of the micro-module from 21 to 25 November 2016. The selected students completed the survey in the class after watching the video clips which consists of introduction and 15 body parts. Three hundred and fifty- three respondents (47.9% female; n=169; 52.1% male; n=184) from 18 different subjects of required and elective PE courses provided in 1st Term of 2016-2017 returned the questionnaires which represent 81.0% response rate. They showed their degree of agreement in five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Table 1 shows that the vast majority of the respondents agreed that most of the content is easy to understand (4.1±0.5), the presentation is interesting (3.7±0.9), most of the content meets their expectations (4.0±0.4), most of the content is informative (4.1±0.4), and the video enhances the knowledge about stretching (4.1±0.4).

Table 1: Feedback analysis of the effectiveness of the stretching video clips

Statements (Degree of Agreement)	Mean ± SD	Range (Mean ± SD)
1. Most of the content is easy to understand.	4.1±0.5	4.0±0.7 – 4.2±0.7
2. The presentation is interesting.	3.7±0.9	3.6±0.8 – 3.8±0.9
3. Most of the content meets their expectations.	4.0±0.4	3.9±0.7 – 4.1±0.7
4. Most of the content is informative.	4.1±0.4	4.1±0.7 – 4.2±0.7
5. The video enhances the knowledge about stretching.	4.1±0.4	4.1±0.7 – 4.2±0.7

Remarks: Five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree)

Focus group

Student feedback has been received from the focus group (men's tennis class) and the open-ended questions in the questionnaire. The feedback can be summarized as follows:

Some students indicated that the presentation is clear which included 1) 3D human and muscle modelling of how the muscle work; 2) the anatomy shows the body part involved during stretching; 3) two students to demonstrate the stretching exercises with different angles; 4) nearly all of the muscle groups are covered. The majority of students like the introduction video clip which is informative and introduces different types of stretching methods as well as the benefits of stretching. However, some students stated that the introduction of specific terms may drive beginners away.

Some students like the background music which is relaxing, whereas some prefer providing

the verbal instruction and explanation instead. The addition of English subtitle and arrow is recommended to provide clear description of the stretching. Moreover, some students suggested that it would be more user-friendly if some caution tips are mentioned in the video clips.

The comments were positive and some adjustments were taken into account to suit their needs and achieve the objectives of the project.

In conclusion, responses received from students are positive. The vast majority of the participants agreed that the micro-module would broaden the knowledge of students concerning stretching exercises which includes general and skill-related stretching of various sports activities. In the long run, the risk of injury due to inappropriate stretching can be reduced.

4. Dissemination, diffusion and impact

Dissemination

The stretching teaching video and e-booklet have been put on the webpage of PE Unit and can be accessed with CUHK student or staff accounts. Central Authentication and Directory Service from ITSC had been sought. Teachers could play videos during the lessons or post the video links on Blackboard for students' self-learning.

(Please Use Internet Explorer to open the links)

To access the web-based stretching teaching video and e-booklet, students can click "Guidelines of Stretching Exercise" (運動伸展指引), which is on the page of "PE Courses" (體育課程) on PE Unit website with the following URLs:

i) http://www.peu.cuhk.edu.hk/zh-tw/pe-courses/stretching (Chi)

ii) http://www.peu.cuhk.edu.hk/en-gb/pe-courses/stretching (Eng)

A staff development workshop was held on 15 Dec 2016 for the teaching staff of PE Unit so that they could familiarize themselves with the web-based learning resources (stretching teaching video and e-booklet).

In order to share our experiences of implementing eLearning projects with the CUHK colleagues, PE Unit plans to join the "Teaching and Learning Innovation Expo 2017", which was jointly organized by CLEAR and ITSC.

PE Unit will also collaborate with CLEAR to share our experiences of constructing and using micro-modules to support flipped classroom activities with other faculties in the coming future.

Diffusion

As a trial, 19 classes out of 164 classes (which have covered all of the 18 subjects of required and elective PE courses provided in 1st Term of 2016-2017) were selected to conduct flipped classroom activities with the micro-module produced. In the coming future, the micro-module can be used in all required and elective PE courses. Since Physical Education course is one of the University Core Courses, applying the micro-module to both required and elective PE courses of different sports events means that nearly all undergraduate students will be included in this project.

Besides, it can also be used in different sports team coaching so that the training performance of different University Team members can be enhanced.

Impact

Flipped classroom activities have been conducted when students have extended their learning

out of class by watching the stretching video themselves with teachers' guidance or instructions. The URLs of video and e-booklet have been uploaded to the PE Unit website and blackboard for students' self-learning. Students can learn much more in-depth knowledge of stretching at their convenience and set their own combination of skill-related stretches by making good use of the online video and e-booklet.

This project can be viewed as a pilot study of developing web-based learning and can serve as a reference for PEU and other departments/units.

PART II

Financial data

Funds available:

Funds awarded from MMCDG	$	91,000
Funds secured from other sources (please specify Physical Education Unit)	$	13,046
Total:	$	104,046

Expenditure: [Note1]

Item	Budget as per application (HK$)	Approved Budget (HK$)	Expenditure (HK$)	Balance (HK$)
1) Staff cost				
a) Research Assistant (part-time) for 2 months	$22,200	$13,200	$23,000	-$9,800
b) Student Helpers	$3,300	$3,300	$3,300	$0
2) Production cost of the video (Outsourcing service of video production company)	$49,000	$49,000	$52,820	-$3,820
3) On-line course & webpage maintenance	$23,000	$23,000	$22,400[Note2]	$600
4) Booklet publishing (for staff)	$1,500	$1,500	$1,410	$90
5) Printing, Stationery & Supplies	$1,000	$1,000	$1,116	-$116
Total:	$100,000	$91,000	$104,046	-$13,046

Note1: The application for extension of unspent balance for this project has been endorsed by the MMCDG committee. Thus, the finalised financial report will be submitted by 31 March 2017.

Note 2: The invoice for media hosting service would be issued in mid-January. Thus, $22,400 is an estimated expenditure for on-line course & webpage maintenance.

PART III

Lessons learnt from the project

Key success factors

Since the deliverables of the project (i.e. an online stretching teaching video and an e-booklet) are online materials, it is easy for students to access them.

In addition, the video is divided into a number of sessions of general stretching by different body parts. An index of skill-related stretching for different sports events has been provided in the e-booklet. With the index and wide coverage of different body parts of the stretching video, it is easy for users to search the stretches they need and set their own combination.

Difficulties encountered and remedial actions taken

With limited budget, we have hired a part-time Research Assistant for 2 months so as to help coordinate this project. However, the working hour was not sufficient. If full-time staff could be employed to share the workload of coordination and deal with the video shooting issues, it is believed that the micro-module could be produced earlier and better.

Student helpers had been hired to do the post-production work of the project. However, as the University examination took place in December, they were not able to finish all of the post-production work by early December. Besides, close supervision was needed.

Role of other units in providing support

To restrict access to the stretching video and e-booklet to CUHK students and staff only, Central Authentication and Directory Service from ITSC has been sought.

Suggestions to CUHK

- Extension of the project time

More time is needed to develop and apply the micro-module. If the project duration can be extended from 1 year to 1.5 year or above, the preparation work and the deliverables could be done better.

- Increasing funding support

As stated above, if full-time staff could be employed to share the workload of coordination and deal with the video shooting issues, it is believed that the micro-module could be produced earlier and better. With increasing amount of funding support, full-time staff could be employed.

PART IV

Information for public access

Summary information and brief write-ups of individual projects will be uploaded to a publicly

accessible CUHK MMCDG website. Please extract from Part I the relevant information to facilitate the compilation of the publicly accessible website and reports.

1. Keywords

Please provide five keywords (in the order of most relevant to your project to least relevant) to describe your micro-modules/pedagogies adopted.

(Most relevant) Keyword 1: General stretching

Keyword 2: Sports skill-related stretching

Keyword 3: Injury prevention

Keyword 4: Physical Education programme

(Least relevant) Keyword 5: Self-learning

2. Summary

Please provide information, if any, in the following tables, and provide the details in Part I.

Table 1: Publicly accessible online resources (if any)
(a) **Project website:** N/A
(b) **Webpage(s):** *If information of your project is summarized in a webpage (say a page in the department's or faculty's website), please provide the URL(s) here.* **(Please Use Internet Explorer to open the links)** To access the web-based stretching teaching video and e-booklet, students can click "Guidelines of Stretching Exercise" (運動伸展指引), which is on the page of "PE Courses" (體育課程) on PE Unit website with the following URLs: i) http://www.peu.cuhk.edu.hk/zh-tw/pe-courses/stretching (Chi) ii) http://www.peu.cuhk.edu.hk/en-gb/pe-courses/stretching (Eng)
(c) **Tools / Services:** N/A
(d) **Pedagogical Uses:** *If any flipped classroom activities have been conducted, please provide information in here. If relevant, please indicate how your project output can be used to support flipped classroom activities.* Flipped classroom activities have been conducted when students have extended their learning out of class by watching the stretching video themselves with teachers' guidance or instructions. The URLs of video and e-booklet have been uploaded to the PE Unit website and blackboard for students' self-learning. Teachers would explain and demonstrate the stretching exercise in class. Students are advised to watch the video again as revision. Then teachers can ask students to lead the stretching exercise at the beginning of the class. The concept of stretching will be consolidated in students' mind.

(e) **Others (please specify):** N/A

Table 2: Resources accessible to a target group of students (if any)

If resources (e.g. software) have been developed for a target group of students (e.g. in a course, in a department) to gain access through specific platforms (e.g. Blackboard, facebook), please specify.

Target students:	All undergraduate students taking Physical Education courses (includes required and elective PE courses)[Note 1]
Term & Year of offering:	1st Term 2016-17 onwards*
Estimated class size:	20-28 students
Platform:	PE Unit website and Blackboard

Note 1: These students were mainly Year 1 students though there are some senior year students as all CUHK undergraduates are required to take Physical Education courses within their first study year.

*As a trial, 19 classes out of 164 classes (which have covered all of the 18 subjects of required and elective PE courses provided in 1st Term of 2016-2017) were selected to conduct flipped classroom activities with the micro-module produced. In other words, 436 students who had taken PHED courses had used the micro-module in 1st Term of 2016-2017.

No.	Course Code	Course Title
1	PHED1010	Special P.E. I 體育特別班（一）
2	PHED1011A	Track and Field (Men) 田徑（男）
3	PHED1015D	Swimming (Men) 游泳（男）
4	PHED1018M	Physical Conditioning (Women) 體能鍛鍊（女）
5	PHED1022D	Basketball (Women) 籃球（女）
6	PHED1023B	Volleyball (Men) 排球(男)
7	PHED1026A	Softball (Women) 壘球（女）
8	PHED1028C	Team Handball (Women) 手球（女）
9	PHED1029D	Soccer (Men) 足球（男）
10	PHED1031F	Tennis (Men) 網球（男）
11	PHED1032G	Tennis (Women) 網球（女）
12	PHED1034A	Squash (Women) 壁球（女）
13	PHED1040A	Woodball 活木球
14	PHED1041D	Badminton (Men) 羽毛球（男）
15	PHED1043B	Table Tennis (Men) 乒乓球(男)
16	PHED1046C	Yoga (Women) 瑜伽 (女)
17	PHED1070X	Archery 射箭
18	PHED1110X	Tai Chi 太極拳
19	PHED1120X	Taekwondo 跆拳道

Table 3: Presentation (if any)	
Please classify each of the (oral/poster) presentations into one and only one of the following categories	**Number**
(a) In workshop/retreat within your unit (e.g. department, faculty)	*1*
(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	*0*
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	*0* *(plan to join CUHK ExPo2017)*
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	*0*
(e) In international conference	*0*
(f) Others (please specify)	*0*

Table 4: Publication (if any)	
Please classify each piece of publication into one and only one of the following categories	**Number**
(a) Project CD/DVD	*0*
(b) Project leaflet	*0*
(c) Project booklet	*1*
(d) A section/chapter in a booklet/ book distributed to a limited group of audience	*0*
(e) Conference proceeding	*0*
(f) A chapter in a book accessible internationally	*0*
(g) A paper in a referred journal	*0*
(h) Others (please specify)	*0*

A one-page brief write up

Please provide a one-page brief write-up of no more than 500 words and a short video.

Stretching is a vital component of physical education since it helps enhance the sports performance and reduce the risk of injury.

In order to enhance the teaching and learning performance of the required and elective Physical Education (PE) courses, stretching exercise (general stretching and skill-related stretching) would be introduced to all undergraduate students of required and elective PE courses through an online teaching video and an e-booklet. General stretching exercises fit all PE courses and are mainly for injury prevention, the skill-related stretching exercises are sports specific which fit into individual PE course and are mainly for performance enhancement.

The video is divided into a number of sessions of general stretching by different body parts. An index of skill-related stretching for different sports events has been provided in the e-booklet for users to set their own combination.

Through watching the video or reading the e-booklet before and after the lessons, the blending learning strategy of flipped classroom could be applied. Students can perform self-learning (e.g. pre-study and revision) by making good use of the online video and e-booklet. Thus, it is hoped to increase students' learning motivation, reduce their risk of injury and improve their performance on different sports.

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MMCD Output

One micro-module was produced. An online teaching video of stretching of approximately 40 minutes has been produced. For easy reference, the video was further divided into a number of sessions of general stretching by different body parts. The summary of the teaching video was compiled into an e-booklet.

(Please Use Internet Explorer to open the links)

1) The online stretching video

i) http://www.peu.cuhk.edu.hk/zh-tw/pe-courses/stretching (Chi)

ii) http:/www.peu.cuhk.edu.hk/en-gb/pe-courses/stretching (Eng)

2) The e-booklet

https://www.cuhk.edu.hk/peu/restricted/login/skill_stretching/Skill_related_Stretching_v7.pdf

3) A short video for the project

http://www.cuhk.edu.hk/peu/Intranet/mmcd_reportvideo/mmcd_reportvideo.htm

Evaluation

Both student surveys and focus-group interview were conducted to assess the effectiveness of the micro-module in facilitating teaching and learning.

In conclusion, responses received from students are positive. The vast majority of the participants agreed that the mirco-module would broaden their knowledge concerning stretching exercises which includes general and skill-related stretching of various sports activities. In the long run, the risk of injury due to inappropriate stretching can be reduced.

Appendix I: Skill-related Stretching for Required and Elective Physical Education Courses e-booklet

The Chinese University of Hong Kong
Faculty of Education
Physical Education Unit

Skill-related Stretching for Required and Elective Physical Education Courses
E-booklet of Skill-related Stretching

Content

1. Introduction

In order to enhance learning and teaching performance for physical education courses, stretching exercise will be introduced to all students of required and elective PE courses through an online teaching video and an e-booklet. General stretching will help students to reduce risk of injury while skill-related stretching will cater for different types of athletes and enhance their sports performance.

Physical fitness contains numbers of components such as strength, power, speed, balance, endurance, coordination, agility, skill, flexibility, etc. Flexibility is one of these in physical fitness. Meanwhile, there are internal and external factors affecting the flexibility. Internal factors like bones, ligaments, muscle length, tendons and skin, etc. can restrict the flexibility while age, gender, temperature, etc. are the external factors.

Stretching is a vital component of physical education since it helps enhance the sports performance and reduce the risk of injury. It is one of the methods for improving flexibility which is important for physical fitness. If the muscle is tight, the range of motion will be restricted. Then, the muscles cannot contract and relax easily which can increase the opportunity of injury.

2. Types of Stretching

There are several methods on stretching, mainly divided by Static Stretches and Dynamic Stretches. Each type of stretching has its own keys, advantages and disadvantages of flexibility, physical fitness and sports performance.

A. Static Stretches

i. Static Stretching

Put your body into a position in which muscles are stretched under tension.
E.g. sitting single leg hamstring stretch

ii. Passive Stretching

Someone or something help you to stretch by applying greater force on the muscles.
E.g. partner assisted chest stretch

iii. Active Stretching

Use the strength of opposite muscles to stretch the targeted muscles without any assistance.
E.g. raise one leg straight up in front as high as possible and maintain the position without any help

iv. Proprioceptive Neuromuscular Facilitation (PNF) Stretching

It involves both stretching and contracting muscles. Firstly, stretch the muscles under tension. Then contract the stretched muscles for 5-6 seconds while someone or something applies resistance to inhibit movement. The contracted muscles are then relaxed and stretched for 30 seconds. Repeat the above process 2-4 times with 15-30 seconds rest on each set.
E.g. lying partner assisted hamstring stretch

v. Isometric Stretching

It is a passive stretching similar to PNF by contracting muscles for a longer period.
E.g. leaning heel back calf stretch

B. Dynamic Stretches

i.Ballistic Stretching (Outdated, not recommended)

Use momentum to swing, bounce, rebound your body to exceed your normal range of motion.

ii.Dynamic Stretching

Control, soft bounce or swing part of your body to the limit of your range of motion.
E.g. leg swing

iii.Active Isolated Stretching

Contract the opposite muscles to force the stretched muscles to relax.
Choose the muscles to be stretched, contract the opposite muscles, stretch quickly and smoothly for holding 1-2 seconds and release the stretch. Repeat 5-10 times.
E.g. sitting leg resting hamstring stretch

iv.Resistance and Loaded Stretching (recommend for well-conditioned athletes)

Dynamic stretching by contracting and lengthening muscles at the same time.

3. The advantages of Stretching
   A. Improve range of motion
   B. Increase power
   C. Reduce delayed-onset muscle soreness
   D. Reduce muscle fatigue
   E. Improve posture
   F. Develop body awareness
   G. Improve coordination
   H. Promote circulation of oxygen and nutrients
   I. Improve relaxation and stress relief

4. Guidelines and Rules of Stretching
   A. Warm-up before stretch

   Work at the lowest resistance on the bike, treadmill or rowing machine for about 2 minutes to raise heart rate and muscle temperature. The warm-up can help muscle to be flexible which ensure the maximum benefit from stretching.

   B. Stretch before and after exercise

The aim of stretch before exercise is to prevent injury by increasing range of motion for 3-8 minutes while that of after exercise for 5-10 minutes is to recover muscles and tendons to prevent delayed-onset muscle soreness and rid the metabolic wastes, prevent blood pooling and promote the delivery of oxygen and nutrients to the muscles.

   C. Stretch only to the point of tension

Stretch should be relaxing and beneficial which is comfortable and positive to our whole body. Stretching with pain is dangerous and damages the joints, muscles and tendons.

   D. Stretch all major muscles and their opposite muscle groups

It is to prevent muscle flexibility imbalance which may cause injury or postural problems by putting great pressure on muscles not stretched.
E.g. quadriceps and hamstrings.

   E. Stretch gently and slowly

Avoid muscle strains and tears.

   F. Breathe slowly and easily while stretching

Promote the delivery of oxygen and nutrients to muscles.

5. Exercise Prescription on Stretching

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6. General Stretching (79)
   A. Neck

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Lateral neck	Move your ear towards your shoulder.	Levator scapulae, Trapezius	Sternocleidomastoideus, Scalenus anterior medius and posterior
2	Rotating neck	Bring your chin towards your shoulder.	Sternocleido-mastoideus	Levator scapulae, Trapezius
3	Forward flexion neck	Move the head down toward your chest.	Semispinalis capitis and cervicis, Spinalis capitis and cervicis	Levator scapulae, Trapezius, Rhomboids
4	Diagonal flexion neck	Move the head down toward your chest. Lean your head to your shoulder.	Levator scapulae, Trapezius, Rhomboids	Semispinalis capitis and cervicis, Spinalis capitis and cervicis, Longissimus capitis and cervicis, Splenius capitis and cervicis
5	Neck extension	Move the head up naturally.	Platysma, Sternocleido-mastoideus	Omohyoideus, Sternohyoideus, Sternothyroideus
6	Neck protraction	Tilt your head forward.	Semispinalis cervicis, Spinalis cervicis, Longissimus cervicis, Splenius cervicis	Levator scapulae, Trepezius, Rhomboids
7	Sitting neck flexion	Sit and lean on a chair. Move the head down toward your chest.	Semispinalis capitis and cervicis, Spinalis capitis and cervicis, Longissimus capitis and cervicis, Splenius capitis and cervicis,	

B. Shoulder

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Parallel arm shoulder	Put the arm (need to be stretched) straight in front and then the other arm press the elbow towards the chest.	Trapezius, Rhomboids, Latissimus dorsi, Posterior deltoid	Infraspinatus, Teres minor
2	Bent arm shoulder	Bend your arm at 90 degrees. Put the arm (need to be stretched) straight in front and then the other arm press the elbow towards the chest.		
3	Cross over shoulder	Stand with bent knee. Cross your arms over and grab the back of your knee while raising up your body.	Trapezius, Rhomboids, Latissimus dorsi	Teres minor
4	Reaching-up shoulder	Place your hand behind your back and reach up to your shoulder.	Supraspinatus, Infraspinatus	Pectoralis mojor, Teres minor, Anterior deltoid, Coracobrachialis
5	Elbow-out rotator	Put your hand behind the middle back and your elbow pointing out. Use other hand to pull the elbow forward.	Infraspinatus, Teres minor	Supraspinatus
6	Reverse shoulder	Clasp your hands behind your back and lift your arms upward.	Anterior deltoid	Biceps brachii, Brachialis, Corabrachialis
7	Assisted reverse shoulder	Stand upright with your back facing a table or bench. Place your hands on it with arms straight and lower your body.	Anterior deltoid, Pectoralis major	Biceps brachii, Brachialis, Brachioradialis, Corabrachialis
8	Arm-up rotator	Point upward by flexing elbow by 90 degrees. Take a stick and put it behind your elbow. Pull the bottom of the stick forward by other hand.	Pectoralis major, Subscapularis, Teres major	Pectoralis minor, Anterior deltoid
9	Arm-down rotator	Point downward by flexing elbow by 90 degrees. Take a stick and put it behind your elbow. Pull the top of the stick forward by other hand.	Infraspinatus, Posterior deltoid	Teres minor

C. Chest

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Above head chest	Clasp your hand and place them above your head with bending arms while forcing elbows backward.	Pectoralis major and minor, Anterior deltoid	Serratus anterior
2	Partner assisted chest	Raise your arms sideway and parallel to the ground. Your partner holds your hands and pulls your arms backward.		Biceps brachii, Brachialis, Brachioradialis, Coracobrachialis
3	Seated partner assisted chest	Sit on the ground. Raise your arms sideway and parallel to the ground. Your partner holds your hands and pulls your arms backward.		
4	Parallel arm chest	Raise your arm sideway and parallel to the ground. Hold on an immovable object and then turn your shoulders from your raised arm.		
5	Bent arm chest	Raise your arm sideway and flexing elbow by 90 degrees upward. Put your forearm on an immovable object and then turn your shoulders from your raised arm.		Serratus anterior
6	Assisted reverse chest	Stand upright with your back facing a table or bench. Place your hands on it with flexing your elbows at 90 degrees and lower your body.		Biceps brachii, Coracobrachialis
7	Bent-over chest	Put your hand on wall and above your head. Lower your shoulder just like moving your chin to the ground.		Serratus anterior, Teres major
8	Kneeling chest	Kneel on the floor. Interlock your forearms and put them on the table or bench. Lower your upper body toward the ground.		

D. Arms and fingers

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Reaching-down Triceps	Clasp your hands behind your head with elbows facing upward. Reach your hands down.	Triceps brachii	Latissimus dorsi, Teres major and minor
2	Triceps	Put your hand behind your neck with elbows facing upward. Pull your elbow down by using other hand, rope or towel.		
3	Kneeling forearm	Kneel on the floor. Put your hands on the ground with forearm facing forward and hands pointing backward.	Biceps brachii, Brachialis, Brachioradialis, Coracobrachialis	Pronator teres, Flexor carpi radialis, Flexor carpi ulnaris, Palmaris longus
4	Palms-out forearm	Interlock your fingers with palms facing outward and straighten your arms.	Pronator teres, Flexor carpi radialis, Flexor carpi ulnaris, Palmaris longus	Flexor digitorum superficialis, Flexor digitorum profundus, Flexor pollicis longus
5	Fingers-down forearm	Hold on your fingers with palms facing downward. Straighten your arms and pull you fingers back using another hand.	Brachialis, Brachioradialis, Pronator teres, Flexor carpi radialis, Flexor carpi ulnaris, Palmaris longus	
6	Finger	Place your fingertips together and push your palms towards each other.	Flexor digitorum superficialis, Flexor digitorum profundus, Flexor pollicis longus, Flexor pollicis brevis	Opponens pollicis, Opponens digiti minimi, Palmar interossei
7	Thumb	Point up your finger and use other hand to pull your thumb down.	Flexor pollicis longus, Flexor pollicis brevis	Adductor pollicis, Opponens pollicis
8	Fingers-down wrist	Hold on your fingers. Straighten your arms and pull you fingers towards your body.	Extensor carpi ulnaris	Extensor digiti minimi, Extensor indicts
9	Rotating wrist	Place your arm straight out and parallel to the ground. Rotate your wrist outward and use another hand to further rotate your wrist.	Brachioradialis, Extensor carpi ulnaris, Supinator	Extensor digitorum, Extensor pollicis longus and brevis

E. Abs

	Stretch	Procedure	Primary muscles	Secondary muscles
1	On elbows abs	Lie down and place your elbows on the floor shoulder-width apart. Keep your hip on the ground, look forward, and rise up onto the elbows.	Transversus abdominis, Rectus abdominis	Psoas major and minor, Iliacus
2	Rising abs	Lie down and place your hands on the floor shoulder-width apart. Keep your hip on the ground, look forward, and rise up by straightening your arms.	External and internal intercostals, External and internal obliques, Transversus abdominis, Rectus abdominis	
3	Standing lean-back abs	Stand upright with your feet shoulder-width apart and put your hands on your buttocks for support. Look upward and lean backward at your waist.		
4	Back arching abs	Sit on a Swiss ball and roll the ball forward while leaning back. Allow your back and shoulders to rest on it and your arms to hang to each side.		Pectoralis major and minor
5	Rotating abs	Lie down and place your hands on the floor shoulder-width apart Keep your hip on the ground, look forward, and rise up by straightening your arms. Then bend one arm and rotate until the shoulder towards the ground.	External and internal obliques, Transversus abdominis , Rectus abdominis	Quadratus lumborum, Psoas major and minor, Iliacus
6	Standing lean-back side abs	Stand upright with your feet shoulder-width apart and put one hand on your buttocks for support. Look upward and lean backward at your waist, then rotate at the waist and put other hand on the same side.		

F. Back and Side

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Reaching forward upper back	Straighten your arms in front and cross over. Push your hands forward and let your head fall forward.	Trapezius, Rhomboids	Semispinalis capitis and cervis, Spinalis capitis and cervicis, Longissmus capitis and cervicis, Splenius capitis and cervicis
2	Reaching upper back	Face the door and sit in a squat position. Hold on a door edge with one hand and lean backwards from the door.	Trapezius, Rhomboids, Latissimus dorsi, Posterior deltoid	Teres major
3	Reach-up back	Raise your arms with cross over and above your head.	Latissimus dorsi	
4	Kneeling reach forward	Kneel on the ground and reach forward with your hands. Let your head fall forward and push your buttocks towards your feet.		Teres major, Serratus anterior
5	Lying whole body	Lie on the floor and extend your arms behind you.	Serratus anterior, Latissimus dorsi	Teres major
6	Sitting bent-over back	Sit on the ground with straightening your legs. Keep your toes pointing up and place your arms by your side. Relax your back and neck and then let your head and chest fall forward.	Semispinalis cervicis and thoracis, Spinalis cervicis and thorascis, Longissimus cervicis and thorascis, Splenius cervicis, Iliocostalis cervicis and thorascis	Interspinales, Rotatores
7	Sitting side reach	Sit on the ground with one leg straight out to the side and keep your toes pointing up. Place your other foot on the side of the knee. Let your head and chest move forward and reach towards the outside of your toes with both hands.	Semispinalis thoracis, Spinalis thorascis, Longissimus thorascis, Iliocostalis lumborum, Intertransversarii, Rotatores, Multifidus	Obliques, Semimembranosus, Semitendinosus, Biceps femoris
8	Kneeling back-arch	Kneel on the ground and place your hands on the ground. Let your head fall forward and arch your back upwards.	Semispinalis cervicis and thoracis, Spinalis cervicis and thorascis,	Interspinales, Rotatores

			Longissimus cervicis and thorascis, Splenius cervicis, Iliocostalis cervicis and thorascis	
9	Kneeling back rotation	Kneel on the ground and raise one arm. Rotate your shoulders and middle back to one side while looking upwards.	Semispinalis thoracis, Spinalis thorascis, Longissimus thorascis, Iliocostalis thoracis, Iliocostalis lumborum, Multifidus, Rotatores, Intertransversarii, Interspinales.	External and internal obliques, Pectoralis major
10	Standing back rotation	Stand upright with your feet shoulder-width apart. Place your hands across your chest and rotate your shoulders to one side.		Quadratus lumborum, External and internal obliques
11	Standing reach-up back rotation	Stand upright with your feet shoulder-width apart. Put your hands above your head and rotate your shoulders to one side.		
12	Lying leg cross-over	Lie on the ground and cross one leg over the other side. Place your arms on the side and straightening both legs. Rotate your back and hip at one side.		Gluteus maximus, medius and minimus, Tensor fasciae latae
13	Lying knee roll-over	Lie on the ground. Flex your knees and keep them together. Place your arms on the side and rotate your back and hip at one side.		Gluteus maximus, medius and minimus
14	Kneeling reach-around	Kneel on your ground and place your hands on the ground. Keep your back parallel to the ground. Use one hand to reach towards the ankle.	Quadratus lumborum, External and internal obliques	Iliocostalis lumborum, Intertransversarii, Rotatores, Multifidus
15	Standing lateral side	Stand upright with your feet shoulder-width apart. Bend your body to one side.		
16	Sitting lateral side	Sit on the bench with feet flat on the ground. Bend your body to one side.		
17	Reaching lateral side	Stand upright with your feet shoulder-width apart and raise one arm. Bend your body to one side.	Quadratus lumborum, External and internal obliques, Latissimus dorsi	Teres minor, Iliocostalis lumborum, Intertransversarii, Rotatores,

				Multifidus

G. Gluteus maximus

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Standing knee-to-chest	Stand with one leg. Bring one knee to the chest level by your hands.	Gluteus maximus	Iliocostalis lumborum
2	Lying knee-to-chest	Lie on the ground and keep one leg straighten. Bring other knee to the chest level by your hands.		
3	Lying double knee-to-chest	Lie on the ground and bring both knees to the chest level by your hands.		Iliocostalis lumborum, Spinalis thoracis, Logissimus thoracis
4	Kneeling back-slump	Kneel and place your hands on the ground. Look up and let your back slump downwards.		Transversus abdominis, Rectus abdominis
5	Sitting knee-to-chest buttocks	Sit with one leg straight and the other leg crossed over your knee. Keep you back straight and shoulder facing forward. Pull the raised knee towards your opposite shoulder.		Semimembranosus, Semitendinosus, Biceps femoris
6	Lying cross-over knee pull-up	Lie on the ground and cross one leg over the other. Place the crossed leg to the opposite knee. Use the opposite hand to pull the crossed knee towards your chest.		
7	Standing high-leg bent knee hamstring	Stand upright and put one foot onto a table. Keep the raised leg bent and lean your chest toward the thigh.		
8	Sitting knee-up rotation	Sit with one leg straight and the other leg crossed over your knee. Rotate your body and put your arm onto raised knee.	Gluteus maximus, medius and minimus, Tensor fasciae latae	Semispinalis thoracis, Spinalis thoracis, Longissimus thoracis, Iliocostails thoracis, Iliocostalis lumborum, Multifidus, Rotatores, Intertransversarii, Interspinales
9	Sitting knee-up extended rotation	Sit with one leg crossed under and the other leg cross over your knee. Rotate your body and put your arm onto the raised knee.	Gluteus maximus, medius and minimus	

H. Gluteal muscles

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Lying cross-over knee pull-down	Lie on the ground and cross one leg over the other side. Bring your foot up to your opposite knee. Use your opposite hand to pull your raised knee towards the ground.	Gluteus medius and minimus	Tensor fasciae latae, Pariformis
2	Lying leg tuck hip	Lie on the abs with bending one leg under abs. Lean towards the ground.	Piriformis, Gemellus superior and inferior, Obturator internus and externus, Quadratus femoris	Gluteus maximus
3	Standing leg tuck hip	Stand and put one foot on a bench or table. Bend your leg and lean forward towards the ground.		
4	Standing leg resting buttocks	Stand beside a bench or table for balance. Put one foot on your opposite knee. Bend your leg and lean forward towards the ground.		
5	Sitting cross-legged reach forward	Sit with leg crossed, keep your back straight and then lean forward.		
6	Sitting feet-together reach forward	Sit with soles facing each other, keep your back straight and then lean forward.		
7	Sitting rotational hip	Sit with one leg crossed and another leg behind your buttocks. Lean your body towards the leg which is behind your buttocks.	Pectineus	Adductor longus, brevis and magnus
8	Standing rotational hip	Stand with one leg crossed and place your other leg on a table. Then lower your body.		
9	Sitting foot-to-chest	Sit with one leg straight. Use hands to hold your other ankle. Pull it towards your chest.	Piriformis, Gemellus superior and inferior, Obturator internus and externus, Quadratus femoris	Gluteus maximus
10	Sitting leg resting buttocks	Sit with one leg slightly bent. Put your other ankle on the raised thigh and then lean forward.		
11	Lying leg resting buttocks	Lie on the ground with one leg slightly bent. Put your other ankle on the raised thigh. Then use hands to hold the raised knee and pull it towards your body.		

I. Quadriceps

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Kneeling quadriceps	Kneel one leg on the ground with that foot facing ground. Push your hips forward.	Iliacus, Psoas major and minor	Rectus femoris, Satorius
2	Standing reach-up quadriceps	Stand upright and take one step forward. Raise your hand above your head. Push your hips forward and lean back.	Rectus femoris, Psoas major, Iliacus, Sartorius	Rectus abdominis, Transversus abdominis, External and internal obliques, Quadratus lumborum
3	Standing quadriceps	Stand upright with one leg standing. Pull your other foot behind your buttocks and push your hips forward. The knee of the bending leg should be on the back of the knee of the supporting leg.	Quadriceps (Rectus femoris, Vastus medialis, lateralis and intermedius)	Iliacus, Psoas major
4	Lying quadriceps	Lie on the ground and facing to the ground with straighten one leg. Pull other foot up behind your buttocks.		
5	On-your-side quadriceps	Lie on the side with straighten one leg. Pull other foot up behind your buttocks and push your hips forward.		
6	Single lean-back quadriceps	Sit on the ground. Bend one knee of the foot next to your buttocks and then lean backwards.		
7	Double lean-back quadriceps	Sit on the ground, bend knees under your buttocks and then lean backwards.		

J. Hamstrings

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Sitting reach forward hamstring	Sit on the ground and straighten your legs. Toes pointing upwards and straighten your back. Then reach forward towards your toes.	Semimembranosus, Semitendinosus, Biceps femoris.	Gastrocnemius
2	Standing toe-pointed hamstring	Stand with one knee bent and other leg straightened out in front. Point your toes to the front and lean forwards. Keep your back straight and put your hands on the bent knee.		
3	Lying partner assisted hamstring	Lie on the ground and straighten your legs. Your partner raise your leg to stretch your hamstring with toes facing backward.		
4	Lying straight knee hamstring	Lie on the ground and straighten your legs. Raise one leg and pull it towards your chest.		
5	Standing toe-raised hamstring	Stand with one knee bent and other leg straightened out in front. Point your toes upwards and lean forwards. Keep your back straight and put your hands on the bent knee.		Gastrocnemius, Soleus
6	Standing leg-up hamstring	Stand upright and put other leg on the bench straight in front. Keep your back straight. Point your toes upwards and lean forwards.		
7	Sitting single leg hamstring	Sit with one leg straight out in front and toes pointing upwards. Place your other foot to the knee. Reach towards your toes with both hands.		
8	Kneeling toe-raised hamstring	Kneel one knee and place the other leg straight forward with heel on the ground. Keep your back straight and point your toes towards your body. Reach towards your toes with one hand.		
9	Standing leg-up toe-in hamstring	Stand upright and place one straightened leg on the bench. Keep your back straight.		Gluteus maximus, Gemellus inferior and superior,

		Point your toes upwards, turn the other foot inward and then lean forward.		Quadratus femoris, Piriformis
10	Lying bent knee hamstring	Lie on the ground and bend one legs. Pull the other knee towards your chest and gently straighten your raised leg.		Gluteus maximus
11	Sitting leg resting hamstring	Sit on the ground with one leg straight in front. Cross the other leg over the thigh. Lean forward with back straight and then reach for your toes.		Soleus
12	Standing leg-up bent knee hamstring	Stand with one foot and put the other foot onto the edge of bench. Keep your raised leg slightly bent and move your chest toward your thigh.		
13	Sitting bent knee toe-pull hamstring	Sit on the ground with both legs slightly bent. Hold onto your toes and pull them towards your body. Keep your back straight and lean forward.		
14	Standing reach down hamstring	Stand upright with your feet shoulder-width apart. Bend your body forward and reach towards the ground.		Gastrocnemius, Gluteus maximus, Iliocostalis lumborum, Spinalis thoracis, Interspinales, Multifidus

K. Hip Adductors

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Standing wide knees adductors	Stand upright with your feet wide apart and point your toes outwards. Bend your knees, lean forward and use your hands to push your knees outwards.	Adductor longus, brevis and magnus	Pectineus
2	Sitting feet together adductors	Sit on the ground with soles facing each other. Place your feet towards your groin. Keep you back straight. Hold onto your ankles and push your knees towards the ground by your elbows.		Gracilis, Pectineus
3	Standing leg-out adductors	Stand upright and put one straight leg on the bench. Keep your toes facing forward and move your standing leg away from the bench.		
4	Kneeling leg-out adductors	Kneel on the ground by one knee and place one straight leg sideway. Place your hand on the ground for balancing and move your leg further sideway.		
5	Squatting leg-out adductors	Stand with your feet wide apart. Straighten one leg and point your toes forward. Bend other leg and point your toes out to the side. Lower your groin towards the ground and place your hands on the bent knee or the ground.		
6	Kneeling face-down adductors	Kneel with your knee and elbows. Lean forward and move your knee side way.		
7	Sitting wide leg adductors	Sit on the ground with placing straight legs wide apart. Keep your back upright and lean forward.		Gracilis, Pectineus, Semimembranosus, Semitendinosus
8	Standing wide leg adductors	Stand on the ground with straight legs wide apart. Point your toes forward, lean forward and reach towards the ground.		

L. Hip Abductors

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Standing hip-out abductor	Stand upright beside a wall with both feet together. Lean your upper body toward the wall and push your hips away from it. Keep your outside leg upright and inside leg slightly bent.	Tensor fasciae latae, Gluteus medius and minimus.	Satorius
2	Standing leg cross abductor	Stand upright and cross one foot behind the other. Lean towards the back foot.		
3	Leaning abductor	Hold on the door jamb with one hand. Push your hips away from it. Keep your outside leg upright and inside leg slightly bent.		
4	Standing leg-under abductor	Hold onto a table and lean forward. Cross one straight foot behind the other and away from the body. Gently bend your front leg to lower your body.		
5	Lying abductor	Lean on the floor with one leg straight. Place the other leg cross over the straight knee. Push your body up with your arm and keep your hip on the ground.		Satorius, Quadratus lumborum
6	Lying Swiss ball abductor	Lean on the Swiss ball with one leg straight. Place the other leg cross over the straight knee. Push your body up with your arm and keep your hip on the ground.		
7	Lying leg hand abductor	Lie on a bench by your side. Allow your top leg fall forward and off the side of the bench.		Satorius. Gluteus maximus

M. Upper Calves

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Standing top-up calf	Stand upright on a step. Put the toes of one foot on the edge of the step and keep your leg straight. Let the heel drop towards the ground.	Gastrocnemius	Tibialis posterior, Flexor hallucis longus, Flexor digitorum longus, Peroneus longus and brevis, Plantaris
2	Single heel drop calf	Stand upright and place your toes on a step. Keep your leg straight and lean toward your toes.		
3	Double heel drop calf	Stand upright on a step. Put your toes on the edge of the step and keep your legs upright. Let the heel drop towards the ground and lean forward.		
4	Standing heel back calf	Stand upright and take one big step backwards. Keep your back leg upright and push your heel on the ground.		
5	Leaning heel back calf	Stand upright, lean against the wall and take one big step backwards. Keep your back leg straight and push your heel on the ground.		
6	Crouching heel back calf	Stand upright and take one big step backwards. Lean your body forward with back straighten.		
7	Standing toe raised calf	Stand with one leg bent and the other leg straight out in front. Point your toes toward your body and lean forward. Keep your back straight and put your hand on your bent knee.	Gastrocnemius, Semimembranosus, Semitendinosus, Biceps femoris.	
8	Sitting toe pull calf	Sit with one leg upright and point your toes upwards. Lean forward and pull your toes back toward your body.		

N. Lower Calves and Achilles

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Standing toe-up Achilles	Stand upright and put your toes on a step. Bend your front leg and lean toward your toes.	Soleus	Tibialis posterior, Flexor posterior, Flexor hallucis longus, Flexor digitorum longus, Peroneus longus and brevis
2	Single heel drop Achilles	Stand on the step with one leg on the edge. Bent your leg and let the heel drop towards the ground.		
3	Standing heel back Achilles	Stand upright and take one big step backwards. Bend your back leg and push your heel towards the ground.		
4	Leaning heel back Achilles	Stand upright, lean against the wall and take one big step backwards. Bend your back leg and push your heel towards the ground.		
5	Sitting bent knee toe pull Achilles	Sit on the ground with bend knees. Grad your toes and pull them towards your knees.		
6	Crouching heel back Achilles	Stand upright and take one big step backwards. Lean your body forward with back straighten. Place your hand on the ground. Bend your back leg and push your heel towards the ground.		
7	Kneeling hell-down Achilles	Kneel on one foot and place your body weight over your knee. Keep your heel on the ground and lean forward.		
8	Squatting Achilles	Stand at a squat position with feet at shoulder-width apart.		

O. Ankles and feet

	Stretch	Procedure	Primary muscles	Secondary muscles
1	Foot-behind shin	Stand upright and put the top of your toes on the ground behind you. Push your ankle towards the ground.	Tibialis anterior	Extensor hallucis longus, Extensor digitorum longus, Peroneus tertius
2	Front cross-over shin	Stand upright and put the top of your toes on the ground in front of the other foot. Slowly bend your other leg to force your ankle toward the ground.		
3	Raised foot shin	Stand upright and put your top of toes on the table behind you. Put your ankle downwards.		
4	Double kneeling shin	Sit with your knee and feet flat on the ground. Sit back on your ankles and keep your heels and knees together. Place your hands next to the knees and slowly lean backwards.		
5	Squatting toe	Kneel on one foot with your hands on the ground. Place your body weight over your knee and slowly move your knee forward. Keep your toes on the ground and arch your foot.	Flexor digitorum brevis, Abductor hallucis, Abductor digiti minimi Quadratus plantae	Flexor hallucis brevis, Adductor hallucis, Flexor digiti minimi brevis
6	Ankle rotation	Raise one foot off the ground and slowly rotate the foot and ankle in all directions.	Soleus, Tibialis anterior	Extensor hallucis longus, Extensor digitorum longus, Peroneus longus, brevis and tertius, Tibialis posterior, Flexor hallucis longus, Flexor digitorum longus

7. Skill-specific Stretching

8. A. Archery		E. Cross Country	
A2	Rotating neck	E6	Standing lean-back abs
A4	Diagonal flexion neck	F4	Kneeling reach forward
B7	Reverse shoulder	F7	Sitting side reach
C6	Assisted reverse chest	G3	Lying double knee-to-chest
D4	Palms-out forearm	H6	Sitting feet-together reach forward
E2	Rising abs	I2	Standing reach-up quadriceps
F7	Sitting side reach	L4	Standing leg-under abductor
F9	Kneeling back rotation	M7	Standing top raised calf
F10	Standing back rotation	N7	Kneeling heel-down Achilles
F11	Standing reach-up back rotation	O1	Foot-behind shin
B. Baseball & Softball (batting)		F. Cycling	
B2	Bent arm shoulder	A3	Forward flexion neck
C4	Parallel arm chest	C6	Assisted reverse chest
C8	Kneeling chest	F2	Reaching upper back
D8	Fingers-down wrist	F12	Lying leg cross-over
E5	Rotating abs	G2	Lying knee-to-chest
F2	Reaching upper back	G8	Sitting knee-up rotation
F12	Lying leg cross-over	H7	Sitting rotational hip
F14	Kneeling reach-around	I5	On-your-side quadriceps
F16	Sitting lateral side	J2	Standing toe-pointed hamstring
G8	Sitting knee-up rotation	M2	Single heel drop calf
C. Baseball & Softball (Throwing)		G. Golf & Woodball	
B5	Elbow-out rotator	A7	Sitting neck flexion
B7	Assisted reverse shoulder	B1	Parallel arm shoulder
C2	Partner assisted chest	B7	Assisted reverse shoulder
D8	Fingers-down wrist	D4	Palms-out forearm
D9	Rotating wrist	E2	Rising abs
E6	Standing lean-back side abs	E5	Rotating abs
F11	Standing reach-up back rotation	F7	Sitting side reach
F15	Standing lateral side	F12	Lying leg cross-over
F17	Reaching lateral side	G8	Sitting knee-up rotation
G8	Sitting knee-up rotation	L4	Standing leg-under abductor
D. Basketball		H. Handball	
A5	Neck extension	B4	Reaching-up shoulder
B1	Parallel arm shoulder	C4	Parallel arm chest
C2	Partner assisted chest	D1	Reaching-down triceps
D5	Fingers-down forearm	E5	Rotating abs
E2	Rising abs	F9	Kneeling back rotation
F7	Sitting side reach	G5	Sitting knee-to-chest buttocks
G2	Lying knee-to-chest	H6	Sitting feet-together reach forward
I2	Standing reach-up quadriceps	I1	Kneeling quadriceps
K5	Squatting leg-out adductors	J6	Standing leg-up hamstring
N7	Kneeling heel-down Achilles	N7	Kneeling heel-down Achilles

I. Racket Sports (Tennis, Squash, Badminton, Table Tennis, etc)		M. Taekwondo	
B8	Arm-up rotator	C2	Partner assisted chest

C7	Bent-over chest	D2	Triceps
D9	Rotating wrist	F1	Reaching forward upper back
E5	Rotating abs	F13	Lying knee roll-over
F12	Lying leg cross-over	G2	Lying knee-to-chest
J10	Lying bent knee hamstring	G8	Sitting knee-up rotation
L4	Standing leg-under abductor	I2	Standing reach-up quadriceps
M7	Standing toe raised calf	J10	Lying bent knee hamstring
N3	Standing heel back Achilles	K2	Sitting feet together adductors
O1	Foot-behind shin	M7	Standing toe raised calf
J. Rugby		N. Tai Chi	
A4	Diagonal flexion neck	A4	Diagonal flexion neck
A7	Sitting neck flexion	A5	Neck extension
C2	Partner assisted chest	B1	Parallel arm shoulder
F9	Kneeling back rotation	B4	Reaching-up shoulder
F13	Lying knee roll-over	F1	Reaching forward upper back
G1	Standing knee-to-chest	F10	Standing back rotation
H4	Standing leg resting buttocks	I3	Standing quadriceps
I1	Kneeling quadriceps	L1	Standing hip-out abductor
J6	Standing leg-up hamstring	M5	Leaning heel back calf
K5	Squatting leg-out adductor	O6	Ankle rotation
K. Soccer		O. Track & Field (Field)	
A4	Diagonal flexion neck	B3	Cross over shoulder
C2	Partner assisted chest	B9	Arm-down rotator
G1	Standing knee-to-chest	C3	Seated partner assisted chest
G8	Sitting knee-up rotation	C8	Kneeling chest
H2	Lying leg tuck hip	D1	Reaching-down triceps
I1	Kneeling quadriceps	D2	Triceps
J9	Standing leg-up toe-in hamstring	D4	Palms-out forearm
K5	Squatting leg-out adductor	D5	Fingers-down forearm
M5	Leaning heel back calf	D8	Fingers-down wrist
O2	Front cross-over shin	F2	Reaching upper back
L. Swimming		P. Track & Field (Jump)	
A3	Forward flexion neck	B7	Reverse shoulder
B4	Reaching-up shoulder	E2	Rising abs
B8	Arm-up rotator	F11	Standing reach-up back rotation
C8	Kneeling chest	G4	Kneeling back-slump
F2	Reaching upper back	G5	Sitting knee-to-chest
F4	Kneeling reach forward	G7	Standing high-leg bent knee hamstring
F5	Lying whole body	H2	Lying leg tuck hip
G6	Lying cross-over knee pull-up	I2	Standing reach-up quadriceps
M2	Single heel drop calf	J4	Lying straight knee hamstring
N5	Sitting bent knee toe pull Achilles	M7	Standing toe raised calf

Q. Track & Field (Track)		R. Volleyball	
B6	Reverse shoulder	B4	Reaching-up shoulder
C8	Kneeling chest	C2	Partner assisted chest
E2	Rising abs	D2	Triceps
F7	Sitting side reach	D6	Finger
G2	Lying knee-to-chest	F3	Reach-up back

H2	Lying leg tuck hip	F17	Reaching lateral side
I1	Kneeling quadriceps	G2	Lying knee-to-chest
J6	Standing leg-up hamstring	H9	Sitting foot-to-chest buttocks
L4	Standing leg-under abductor	K1	Standing wide knees adductor
N4	Leaning heel back Achilles	N7	Kneeling heel-down Achilles

Reference

Walker, B. (2011). *The Anatomy of stretching: Your illustrated guide to flexibility and injury rehabilitation*. North Atlantic Books.